OPTIMAL INTERVENTIONS IN HOST-NATION HEALTH SYSTEMS DURING COUNTERINSURGENCY OPERATIONS

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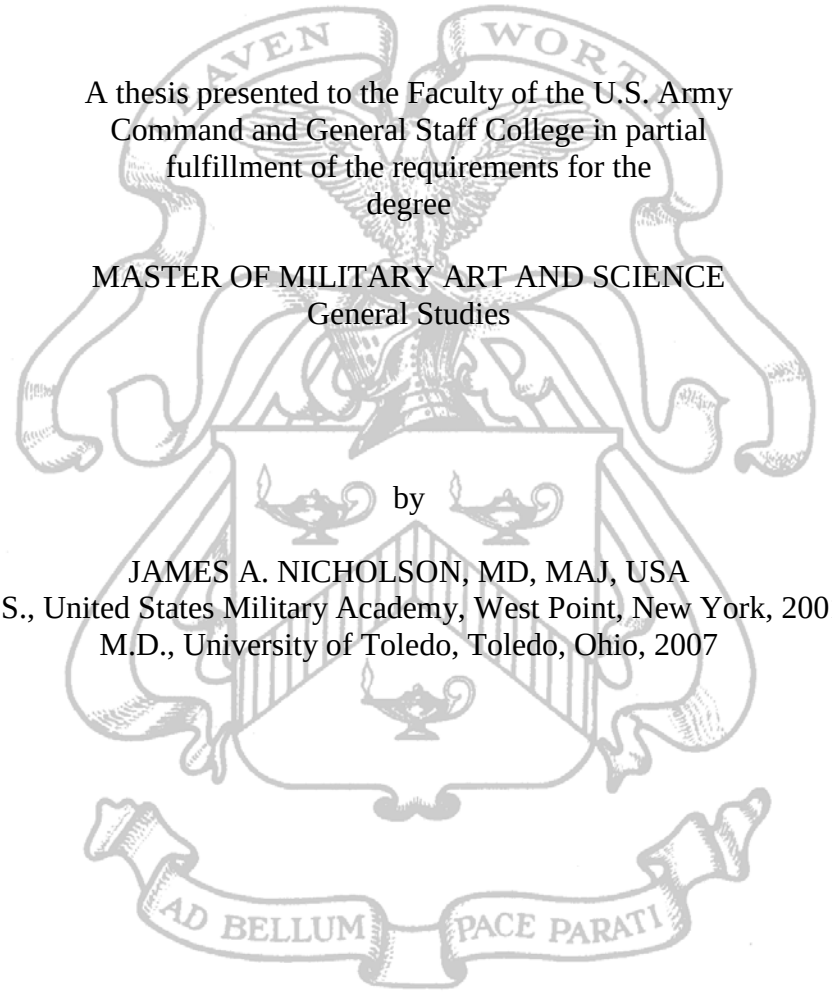
MASTER OF MILITARY ART AND SCIENCE
General Studies

by

JAMES A. NICHOLSON, MD, MAJ, USA
B.S., United States Military Academy, West Point, New York, 2001
M.D., University of Toledo, Toledo, Ohio, 2007



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The people of Afghanistan continue to face challenges in primary health care despite the expenditure of over $92 billion on humanitarian assistance. Therefore, using the Afghanistan experience as a model, what interventions by the United States Army are optimal in the development of host-nation health systems during counterinsurgency (COIN) operations? To answer this, statistical analysis evaluated 14 countries with an insurgency against 42 non-insurgency countries that spanned diverse economic, geographic, and cultural backgrounds. Analysis showed that high-income nations were better than insurgent countries in every category that achieved statistical significance. As such, COIN goals should not include healthcare expectations similar to those in high-income nations. In addition, it appears that insurgency imposes an opportunity cost on the overall health of a society, which serves to exacerbate conditions more than a simple economic classification would suggest. Finally, stability operations within COIN should consider childhood malnutrition rates and the access to improved water sources as good examples of potential measures of effectiveness (MOEs) that may positively influence broad segments of the host-nation populace. These findings grant insight in defining the role that the Army should provide in facilitating primary health care within the context of a broader COIN strategy in coordination with unified action partners.

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Name of Candidate: MAJ James A. Nicholson, MD

Thesis Title: Optimal Interventions in Host-Nation Health Systems During Counterinsurgency Operations

Approved by:

_____, Thesis Committee Chair
Allan S. Boyce, MS

_____, Member
W. Chris King, Ph.D.

_____, Member
LTC Stephen W. Smith, MPH

Accepted this 12th day of December 2014 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, Ph.D.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

OPTIMAL INTERVENTIONS IN HOST-NATION HEALTH SYSTEMS DURING COUNTERINSURGENCY OPERATIONS, by MAJ James A. Nicholson, MD, 118 pages.

The people of Afghanistan continue to face challenges in primary health care despite the expenditure of over $92 billion on humanitarian assistance. Therefore, using the Afghanistan experience as a model, what interventions by the United States Army are optimal in the development of host-nation health systems during counterinsurgency (COIN) operations? To answer this, statistical analysis evaluated 14 countries with an insurgency against 42 non-insurgency countries that spanned diverse economic, geographic, and cultural backgrounds. Analysis showed that high-income nations were better than insurgent countries in every category that achieved statistical significance. As such, COIN goals should not include healthcare expectations similar to those in high-income nations. In addition, it appears that insurgency imposes an opportunity cost on the overall health of a society, which serves to exacerbate conditions more than a simple economic classification would suggest. Finally, stability operations within COIN should consider childhood malnutrition rates and the access to improved water sources as good examples of potential measures of effectiveness (MOEs) that may positively influence broad segments of the host-nation populace. These findings grant insight in defining the role that the Army should provide in facilitating primary health care within the context of a broader COIN strategy in coordination with unified action partners.

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This work would not have been possible without the efforts of the men and women who composed Special Operations Task Force–West (SOTF-W) in Shindand Afghanistan from April to October 2013. These Soldiers, Marines, Sailors, and Airmen struggled under difficult circumstances against an elusive enemy alongside their counterparts in the 4th and 9th Afghan Special Operations Kandaks. Fighting on the same ground once trod by Alexander the Great, the members of SOTF-W remained unflinching quiet professionals a dozen years after the attacks of September 11th. This work serves as a testimony to their efforts in seeking to find optimal methods in the application of unified action using the collective experience gained from fighting in America's longest war.

Similarly, the insight gleaned from the faculty at the Command and General Staff College served as the intellectual foundation to this document. In particular, committee members Mr. Allan Boyce, Dr. Chris King, and LTC Stephen Smith remained stalwart partners throughout the process of composing this thesis. Furthermore, the expertise of Dr. David Bitters was essential in completing the statistical analysis of this work and his assistance and insight proved invaluable. My hope is that this document displays a synthesis of knowledge across a range of professional specialties to formulate specific recommendations in improving the Army's delivery of healthcare in a unique operational environment.

Finally, this project would not have been possible without the support of my wife, Stacey, and the wonderful family we share. Her support and dedication rivals that of Penelope, for which I am eternally grateful.

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ACRONYMS

ADP	Army Doctrine Publication
ADRP	Army Doctrine Reference Publication
ANOVA	Analysis of Variance
ASI	Additional Skill Identifier
ATP	Army Training Publication
AUTL	Army Universal Task List
BPHS	Basic Package of Health Services
CAT	Civil Affairs Team
CDHAM	Center for Disaster and Humanitarian Assistance Medicine
CFE-DMHA	Center for Excellence in Disaster Management and Humanitarian Assistance
CIA	Central Intelligence Agency
CMR	Crude Mortality Rate
COCOM	Combatant Command
COIN	Counterinsurgency
DALY	Disability Adjusted Life Year
DoD	Department of Defense
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities
FHA	Foreign Humanitarian Assistance
FM	Field Manual
GDP	Gross Domestic Product
GNI	Gross National Income
IGO	Intergovernmental Organization

ISAF	International Security Assistance Force
JP	Joint Publication
JTF	Joint Task Force
MEDCAP	Medical Civic Action Program
MEDCOM	Medical Command
METL	Mission Essential Task List
MHS	Military Health System
MOE	Measure of Effectiveness
MOP	Measure of Performance
MoPH	Ministry of Public Health
NGO	Non-governmental Organization
OCHA	Office for the Coordination of Humanitarian Affairs
PHC	Primary Health Care
PRT	Provincial Reconstruction Team
SIGAR	Special Inspector General for Afghanistan Reconstruction
SOP	Standard Operating Procedure
U5MR	Under-five Mortality Rate
UJTL	Universal Joint Task List
UNHCR	United Nations High Commissioner for Refugees
USACE	United States Army Corps of Engineers
USAID	United States Agency for International Development
USG	United States Government
VMOP	Village Medical Outreach Program
WHO	World Health Organization

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CHAPTER 1

INTRODUCTION

"You are the first doctor to visit us," said Dr. Mohammad Safi, the 4th Special Operations Kandak (SOK) physician and head medical officer. When pressed with the question as to why no medical professionals had ever bothered to assess the capabilities of one of nine elite battalion-sized special operations organizations within the Afghan Ministry of Defense, Dr. Safi simply shrugged and replied curtly "we thought no one cared." Over the following six months, the validation of the SOK medics and officer staff in Tactical Combat Casualty Care (TCCC) and en-route care provided the skills necessary for Commando casualties to survive the two-hour drive to the Afghan military hospital in Herat. Upon achieving this successful milestone, the SOK medics were familiarized with the Afghan rotary and fixed-wing medical evacuation assets co-located at Shindand Air Base, a mere kilometer from their own location at Firebase Thomas. The senior medical staff was then fully integrated within the nascent medical capacity being built at the higher headquarters, the Afghan 2nd Special Operations Brigade (SOB), which specifically included the SOB's Mobile Strike Force and its newly purchased armored ambulances worth over $1 million apiece.[1]

With a basis of trust and friendship established, Dr. Safi and his Soldiers also provided valuable ground truth regarding the local healthcare facilities that serviced the people of Shindand Province. Specifically, CPT Sultan, Dr. Safi's physician assistant, lived in the area and served as a dentist and pharmacist in the city of Shindand. Of particular interest was the new $4.9 million Shindand hospital that the United States Army Corps of Engineers (USACE) supervised construction of less than six months

prior.[2] Dr. Safi, stated, “the hospital is terrible; it lacks water and power and is unacceptable.” The fact that the hospital was undermanned, and that the contracted physicians currently working there were from areas outside Herat Province, meant that there was little commitment from the hospital staff to the local civilian populace. Additionally, although funds from the United States Agency for International Development (USAID) subsidized the salaries of hospital employees, there was little oversight to ensure that monies paid corresponded to actual work provided.

The Civil Affairs Team (CAT) responsible for the region performed a site assessment upon arrival in country, the first since the hospital’s completion, but did so only to check on the feasibility of integrating Afghan Commando Medics into the training there, not to assess whether or not it was a functional institution meeting the needs of the people. More regrettably, upon identification of the hospital’s shortfalls the Provincial Reconstruction Team (PRT), Special Operations Task Force (SOTF), and Regional Command–West (RC-W) authorities all determined it to be “an Afghan problem.” No one at the Combined Joint Special Operations Task Force–Afghanistan (CJSOTF-A) or their higher headquarters, the Special Operations Joint Task Force (SOJTF), had any visibility on the recently built hospital in Shindand. Likewise, the USAID official in Herat directed any inquires to the Afghan Ministry of Public Health (MoPH) who never responded to any requests for assistance. This left the people of Shindand exactly where they were in 2002, with no emergency or surgical care within 75 miles and persistent mortality from routine preventable causes, all within the setting of an unstable security environment.

The situation experienced in Shindand, Afghanistan begs the larger question; why, after the expenditure of vast amounts of money and resources into the Afghan health-sector development effort, are the health indices that reflect individual Afghan wellbeing still among the worst in the world? With the Afghanistan experience as a model, this thesis seeks to determine what interventions the United States Army could apply in health reconstruction and development for optimal results in a counterinsurgency operation. Chapter 2 reviews the history of the health situation in Afghanistan as well as the interventions made by International Security Assistance Force (ISAF) in health sector development. The second chapter continues with a review of the precedent of health sector development as a valuable tool for improving the general welfare of a society, the unique nature of an insurgency, and the how the United States Army can make suitable interventions that support both public health goals and an overall counterinsurgency strategy. The third chapter examines the methodology applied to the primary research question, while chapter 4 provides a logical recommendation for what optimal interventions by the Army in health sector development may be. Finally, chapter 5 summarizes the findings presented throughout this thesis to delineate suggestions for maximum effectiveness in heath sector development during counterinsurgency operations by the United States Army.

Primary Research Question

Using the Afghanistan experience as a model, what interventions by the United States Army are optimal in the development of host-nation health systems during counterinsurgency operations?

Secondary Research Questions

In an effort to answer the primary research question, multiple secondary research questions require attention, specifically:

1. How has the health of Afghans changed as a result of ISAF interventions?
2. What are the established methods for health sector improvement in the developing world?
3. Why are the essential needs, particularly the medical needs, of the populace important in a counterinsurgency operation?
4. What is the Army doctrinal foundation for intervening in health sector development?
5. Which health sector interventions provide the greatest impact while also facilitating strategic counterinsurgency goals?

Assumptions

This work assumes that the United States Army will continue its involvement with counterinsurgency operations into the future. Furthermore, an assumption is that the lessons from Afghanistan are relevant to future counterinsurgency operations.

Key Definitions

Counterinsurgency (COIN): A comprehensive civilian and military effort designed to simultaneously defeat and contain insurgency and address its root causes.[3]

Insurgency: The organized use of subversion and violence to seize, nullify, or challenge political control of a region.[4]

Unified Action: The synchronization, coordination, and-or integration of joint, single-service, and multinational operations with the operations of other United States government departments and agencies, non-governmental organizations (NGOs), intergovernmental organizations (IGOs) (e.g., the United Nations), and the private sector to achieve unity of effort.[5]

Critical Premises

As defined by Army Training Publication (ATP) 3-07.5, *Stability Techniques*, an essential service is one that fills a basic human need.[6] Healthcare, in the broad sense, is therefore included as an essential government service. The World Health Organization (WHO) further clarifies the fundamental of healthcare as Primary Health Care (PHC), specifically:

> Essential health care; based on practical, scientifically sound, and socially acceptable method and technology; universally accessible to all in the community through their full participation; at an affordable cost; and geared toward self-reliance and self-determination.[7]

PHC includes eight specific areas: education, nutrition and safe food—water supplies, maternal and child care, immunization against the major infectious diseases, prevention and control of locally endemic diseases, appropriate treatment of common diseases, promotion of mental health, and the provision of essential drugs.[8] In societies facing challenges in PHC, typically the largest impacts in reducing morbidity and mortality may occur through relatively simple initiatives such as clean drinking water, vaccines, and maternal prenatal care, which typify the demands of these populations when compared to more developed countries. Likewise, experience in health sector development has shown that the application of financial resources towards health needs can have an enormous

effect provided that these resources are concentrated on true priorities.[9] It is these factors, along with their interplay in the overall security situation, that similarly have the greatest impact in the overall health of the people of Afghanistan. Thus, in rebuilding a struggling country within the construct of a counterinsurgency strategy, the development of reliable PHC provides an avenue to foster trust between the civilian populace and the national government. This newfound trust can then potentially have the net effect of improving the lives of the population while also increasing the support of the legitimate government among the populace.

Currently, the United States Army leverages combat power to fulfill wide area security as a core competency within the framework of Unified Land Operations.[10] As such, the United States Army is the primary organization whose mission requirements may include the task to develop effective PHC assets in countries with volatile security situations necessitating long-term commitment. However, while the Army has organizations such as the United States Army Corps of Engineers to oversee the large construction projects under such circumstances, the United States Army and the Department of Defense (DoD) at large lack a similar organization focused on the operational delivery of improving host-nation PHC. Effective mentors of healthcare efforts include Special Forces Medical Sergeants and Civil Affairs Teams who can assist in local development concerns. However, these capable resources cannot address countrywide medical issues or the development of effective broader healthcare systems with the capacity to positively influence health metrics such as the under five year-old mortality rate. Indeed, according to Field Manual (FM) 4-02, *Army Health System*, none of the explicit 10 medical functions includes the development of a host nation health

system or the effective delivery of humanitarian aid.[11] This lack of focus in prioritizing PHC assistance has perpetuated the poor health status in Afghanistan and serves as an example to demand the utilization of more accurate and objective measures of population health improvement in future endeavors.

Scope, Limitations, and Delimitations

While the focus of this study is the determination and application of health metrics in the delivery of PHC assistance, this study is not concerned with the specifics unique to each individual public health crisis as such a task would be too expansive for this work alone. Rather, the assumption is that the American and Coalition experience in Afghanistan provides valuable lessons that are applicable in some capacity towards future combat and stability endeavors. Additionally, while analysis gleaned from this study may be applicable across the spectrum of the Operational Planning Model (Phases 0 through 5) in future conflict, for clarity of purpose, this work will confine its analysis to methods that support the application of soft power via an indirect approach towards defeating an insurgency. Likewise, population health data, and the inherent variance in obtaining such statistics, are assumed to be valid representations of the overall health of the populace and accurate for comparison between nations. Finally, it is necessary to acknowledge that in no way does this work presume that humanitarian actions can, in any capacity, fully replace the need for kinetic, and lethal, combat operations. Rather, the hope is that critical analysis of recent experience can lead to the development of effective techniques that may shorten the duration of future conflicts in the hope of securing peace and stability for all.

Study Significance

This research contributes to the knowledge of counterinsurgency warfare and the role that the Army should provide in facilitating PHC through reconstruction and intervention. The conclusions reached through answering the primary and secondary research questions may influence how the Army pursues its medical development efforts in the future.

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[1] Defense Industry Daily, "Commando Family Armored Cars for the Afghan National Army," last modified March 7, 2013, accessed February 17, 2014, http://www.defenseindustrydaily.com/m1117-asvs-for-the-afghan-national-army-06750/.

[2] United States Army Central Command, "USACE Completes Construction of Medical Facility in Shindand," last modified January 29, 2013, accessed February 17, 2014, http://www.centcom.mil/news/usace-completes-construction-of-medical-facility-in-shindand-read-more-http-www-dvidshub-net-new.

[3] Joint Chiefs of Staff, Joint Publication (JP) 3-24, *Counterinsurgency* (Washington, DC: Government Printing Office, November 2013), ix.

[4] Ibid.

[5] Joint Chiefs of Staff, Joint Publication (JP) 1, *Doctrine for the Armed Forces of the United States* (Washington, DC: Government Printing Office, March 2013), xiii.

[6] Department of the Army, Army Training Publication (ATP) 3-07.5, *Stability Techniques* (Washington, DC: Government Printing Office, August 2012), 4-1.

[7] University of Saskatchewan College of Medicine, "Definition of Primary Health Care," accessed April 27, 2014, https://www.medicine.usask.ca/research/health-research-groups/primary-health-care-research-group-1/definition-of-primary-health-care/.

[8] Ibid.

[9] Dean T. Jamison et al., eds., *Disease Control Priorities in Developing Countries*, 2nd ed. (Washington, DC: World Bank, 2006), accessed April 27, 2014, http://www.ncbi.nlm.nih.gov/books/NBK11754/.

[10] Department of the Army, Army Doctrine Publication (ADP) 3-0, *Unified Land Operations* (Washington, DC: Government Printing Office, October 2011), 6.

[11] Department of the Army, Field Manual (FM) 4-02, *Army Health System* (Washington, DC: Government Printing Office, August 2013), 1-10.

CHAPTER 2

THE AFGHANISTAN EXPERIENCE AND REVIEW OF HEALTH SECTOR DEVELOPMENT, INSURGENCY THEORY, AND ARMY DOCTRINE

Following 13 years of conflict in Afghanistan, it is necessary to pause and take account of where the Afghan people are relative to their situation prior to the involvement of Western troops under the International Security Assistance Force (ISAF). While the individual well-being of Afghans is difficult to assess, analysis of the broader indices of overall health allow a general elucidation of what impact billions of dollars of aid has yielded. Unfortunately, this analysis does not reveal a particularly impressive return on ISAF investment. In the 2009 (Solar Hijri calendar year 1387) Afghanistan Ministry of Public Health (MoPH) annual report:

> Afghanistan has taken a devastating toll during the past three decades with the human and socio-economic indicators still hovering near the bottom of international indices. The country suffers greatly from very high levels of Infant Mortality Rate (IMR) at 129/1000 live births, Under 5 Mortality Rate (U5MR) at 191/1000 live births and the Maternal Mortality Ratio (MMR) is estimated at 1600 for every 100,000 live births, the highest in the world except Sierra Leone. By all measures, the people of Afghanistan fare far worse, in terms of their health, than any other country of the region.[1]

Subsequent data remains less than reassuring. For example, according to the Central Intelligence Agency (CIA) World Factbook, Afghanistan remains number 220 in the world (out of the 223 total countries and territories where the CIA tracks this) in overall life expectancy.[2] Likewise, Afghanistan has one of the highest infant mortality rates in the world.[3] Ultimately, the question that must be posed is what gains in overall security can be expected when a young Afghan child has a 10 percent chance of dying

from an otherwise largely preventable cause prior to the age of five?[4] Table 1 summarizes the heath data of Afghanistan. This data is from the World Bank and the World Health Organization (WHO) and notes a selection of the significant metrics evaluated from 1999 through 2012 (for complete source data information, please see Appendix A).[5]

Table 1. Afghan Health Data

	AFGHANISTAN													
	Year													
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Population Metric														
Population (Total)[1]	19987071	20595360	21347782	22202806	23116142	24018682	24860855	25631282	26349243	27032197	27708187	28397812	29105480	29824536
Population growth (Annual %)[2]	2.5	3	3.6	3.9	4	3.8	3.4	3.1	2.8	2.6	2.5	2.5	2.5	2.4
Population ages 65 and Above (%)[3]	7	7	7	7	8	8	9	9	9	10	2	2	2	2
Population 0 to 14 (%)[4]	49	49	50	50	49	49	49	49	49	49	49	49	48	47
Economic Metric														
GDP per capita (Current US $)[5]	NA	NA	115	186	198	220	252	275	374	377	451	561	614	687
Health expenditure, Public (% of government expenditure)[6]	NA	NA	NA	6.7	1.4	1.9	1.1	1.5	1.4	2.6	3	3.5	3.5	7.1
Health Metric														
Access to improved drinking water (%)[7]	NA	22	NA	NA	NA	NA	40	NA	NA	NA	NA	57	NA	64
Access to improved sanitation (%)[8]	NA	23	NA	NA	NA	NA	26	NA	NA	NA	NA	28	NA	29
Maternal mortality ratio (modeled estimate per 100,000 live births)[9]	NA	1100	NA	NA	NA	NA	730	NA	NA	NA	NA	500	NA	400
Infant mortality rate (per 1000 live births)[10]	95	94	92	90	88	85	83	81	79	78	76	74	73	71
Under 5 mortality rate (per 1000 live births)[11]	137	134	131	128	124	121	118	115	112	109	106	104	101	99
Malnutrition prevalence, weight for age (% of children under 5)[12]	NA	NA	NA	NA	NA	33	NA	NA	NA	NA	NA	NA	NA	NA
One year-old immunized with BCG (%)[13]	38	30	43	46	44	51	57	60	60	66	64	68	71	75
One year-old immunized with DPT3 (%)[14]	27	24	33	36	41	50	58	58	63	64	63	66	68	71
One year-old immunized with HBV3 (%)[15]	0	0	0	0	0	0	0	0	63	64	63	66	68	71
One year-old immunized with measles vaccine (%)[16]	31	27	37	35	39	48	50	53	55	59	60	62	65	68
One year-old immunized with OPV3 (%)[17]	27	24	35	36	41	50	58	58	63	64	63	66	68	71

Source: Created by author.

Close examination of the data above notes some particularly concerning issues. For example, while the Afghan under-five mortality rate (U5MR) has shown recent improvement (now down to 99 deaths per 1,000), this places Afghanistan second only to Somalia and South Sudan for the worst U5MR in the Eastern Mediterranean Region, which are countries that have not had the benefit of ISAF largess.[6] Similarly, Afghanistan only ranks ahead of Somalia in regards to the worst rate of infant mortality amongst the 23 Eastern Mediterranean Region countries in 2012.[7]

Even if one chose to ignore mortality data, the underlying assessment of Afghan water, sanitation, and nutritional status illustrates the significant problems that serve to exacerbate Afghan health in general. For example, despite billions of dollars in aid money, roughly one-third of Afghans still lack access to improved drinking water sources.[8] Likewise, from 1999 to 2012, Afghan access to improved sanitation only improved from 23 percent to 29 percent.[9] Lastly, the malnutrition present amongst the under five year-old population remains largely unchanged since 2004, as recent Afghan surveys report approximately one-third of all children under five in southern Afghanistan are acutely malnourished despite hundreds of millions of foreign-aid dollars.[10]

How does this data compare to other countries that are also facing similar issues involving health and national development? Using the CIA World Factbook, the Gross Domestic Product (GDP) per capita provided a sample of comparable countries to rank-order these nations and territories. Why choose the GDP per capita? Admittedly, while this is an arbitrary selection, it does provide a valuable tool to compare the relative purchasing power of an individual citizen, and thus, the relative means at a person's disposal to buy the goods and services they require. This rank-order process showed that

the worst territory in the world for GDP per capita was the Democratic Republic of the Congo (number 228), with Afghanistan being slightly higher at number 216.[11] Given that there were a dozen countries between Afghanistan and the Congo, the dozen countries ranked directly above Afghanistan were included for analysis as well to yield 24 total nations for comparison. Using this sample set, the World Bank and WHO provided data to assess select economic, population, and health metrics. Data was selected from the year 2010 because this marked the tenth anniversary of the United Nation's Millennium Development Goals interim report that included findings on eight developmental issues targeted for improvement by 2015 (for complete source data information, please see Appendix B).[12]

Table 2. Country Comparison

Country Comparison

GDP per Capita Ranking	Country	GNI per Capita (Atlas Method)[1]	Population[2]	Access to Improved Water Sources (Percent)[3]	Access to Improved Sanitation (Percent)[4]	Maternal Mortality Ratio (Modeled Est. Per 100,000	Infant Mortality Rate (Per 1000 Live Births)[6]	Under 5 Mortality Rate (Per 1000 Live Births)[7]	Children <5 Underweight (Percent)[8]	Measles Immunization (Percent of Children 12-23 Months)[9]	Life Expectancy at Birth (Years)[10]
204	Rawanda	$510	10836732	70	61	390	44	64	11.7*******	95	62
205	Nepal	$540	26846016	86	34	220	36	46	29.1*******	86	67
206	Uganda	$470	33987213	72	33	410	51	78	14.1*******	73	57
207	South Sudan	$950	9940929	57*	9*	830	71	112	32.5****	62*	53
208	Sierra Leone	$450	5751976	58	13	1200	123	193	18.6	80	45
209	Comoros	$810	683081	95	35	380	61	83	25.0*	72	60
210	Haiti	$650	9896400	62	24	420	73	175	18.9****	58	62
211	Ethiopia	$340	87095281	48	21	500	51	76	29.2*******	66	61
212	Eritrea	$310	5741159	61**	14**	450	40	56	34.5**	99	61
213	Guinea-Bisseau	$540	1586624	70	18	600	85	137	16.6******	69	54
214	Mozambique	$430	23967265	48	20	540	71	101	15.6*******	82	49
215	Guinea	$400	10876033	73	18	690	70	110	20.8******	58	55
216	Afghanistan	$510	28397812	57	28	500	74	104	32.9***	62	60
217	Mali	$660	13985961	64	21	600	83	138	27.9****	63	54
218	Togo	$460	6306014	59	11	480	65	101	16.5	68	55
219	Madagascar	$420	21079532	48	13	480	44	63	36.8***	73	63
220	Tokelau*	NA	1411	NA	NA	0	0	0	NA	NA	69
221	Malawi	$310	15013694	81	10	540	53	83	13.8	93	53
222	Niger	$370	15893746	51	9	690	67	127	39.9****	71	57
223	Liberia	$270	3957990	72	17	680	61	83	20.4*****	65	59
224	Central African Republic	$490	4349921	67	34	960	95	138	28****	53	48
225	Burundi	$200	9232753	75	46	820	71	112	29.1*******	92	53
226	Zimbabwe	$470	13076978	80	44	610	59	97	10.1*******	90	54
227	Somalia	$150*	9636173	31	24	930	96	156	32.8****	46	54
228	Dem. Republic of the Congo	$190	62191161	46	23	810	105	155	24.2	74	49

Source: Created by author.

In compiling this data, a number of interesting trends emerged. For example, in the Afghanistan data in table 1, significant improvements in the maternal mortality rate, infant mortality rate, and the U5MR transpired with massive reductions in all of these indices from 1999 to 2012. However, upon review of this data in the country analysis, a reduction in these same metrics was seen in every one of the nations listed in table 2 from 1990 through 2010 with the exception of Zimbabwe (all indices) and Haiti (U5MR only). Of note, Haiti's significant U5MR is solely attributable to the earthquake and subsequent cholera outbreak in 2010, as the U5MR in 2009 was 82, and improved to 78 in 2011(for complete source data information, please see Appendix C).[13]

Table 3. 1990 Through 2010 Comparisons

	Maternal Mortality Ratio[1]			Infant Mortality Rate[2]			U5 Mortality Rate[3]		
	1990	2010	Percent Δ	1990	2010	Percent Δ	1990	2010	Percent Δ
Rawanda	1400	390	72.1	92	44	52.2	151	64	57.6
Nepal	790	220	72.2	99	36	63.6	142	46	67.6
Uganda	670	410	38.8	107	51	52.3	178	78	56.2
South Sudan	1800	830	53.9	149	71	52.3	251	112	55.4
Sierra Leone	2300	1200	47.8	153	123	19.6	257	193	24.9
Comoros	630	380	39.7	87	61	29.9	124	83	33.1
Haiti	670	420	37.3	100	73	27.0	144	175	-21.5
Ethiopia	1400	500	64.3	121	51	57.9	204	76	62.7
Eritrea	1700	450	73.5	92	40	56.5	150	56	62.7
Guinea-Bisseau	930	600	35.5	122	85	30.3	206	137	33.5
Mozambique	1300	540	58.5	155	71	54.2	233	101	56.7
Guinea	1100	690	37.3	142	70	50.7	241	110	54.4
Afghanistan	1200	500	58.3	120	74	38.3	184	104	43.5
Mali	1100	600	45.5	130	83	36.2	253	138	45.5
Togo	660	480	27.3	89	65	27.0	143	101	29.4
Madagascar	740	480	35.1	97	44	54.6	159	63	60.4
Tokelau	NA	0	NA	NA	0	NA	NA	0	NA
Malawi	1100	540	50.9	143	53	62.9	244	83	66.0
Niger	1000	690	31.0	137	67	51.1	326	127	61.0
Liberia	1200	680	43.3	165	61	63.0	248	83	66.5
Central African Republic	1200	960	20.0	113	95	15.9	171	138	19.3
Burundi	1300	820	36.9	100	71	29.0	164	112	31.7
Zimbabwe	520	610	-17.3	50	59	-18.0	74	97	-31.1
Somalia	1300	930	28.5	107	96	10.3	177	156	11.9
Dem. Republic of the Congo	1000	810	19.0	112	105	6.3	171	155	9.4

Source: Created by author.

Indeed, the WHO notes:

> Globally, under-five mortality has decreased by 47%, from an estimated rate of 90 deaths per 1000 live births in 1990 to 48 deaths per 1000 live births in 2012. The average annual rate of reduction in under-five mortality has accelerated—from 1.2% a year over the period 1990–1995 to 3.9% for 2005–2012—but remains insufficient to reach MDG 4 (Millennium Development Goal 4: Reduce Child Mortality). About 17,000 fewer children died every day in 2012 than in 1990, the baseline year for measuring progress.[14]

The source of this overall decline is multifaceted. Dr. Dean Jamison, working for the National Institutes of Health, noted in *Working Paper 21* of the Disease Control Priority Project that economic improvement and urbanization are partial explanations for the observed decline.[15] However, it was also concluded that "technical progress and educational improvements are far more important in explaining why infant mortality has declined at such different rates in different countries."[16] These conclusions correspond to the known scientific findings of the past half-century. Dr. Kingsley Davis published in 1956 that the decline of mortality in the underdeveloped world occurred through the "discovery of new methods in disease treatment applicable at reasonable cost, [and] the diffusion of these new methods from advanced countries to the unadvanced."[17] Therefore, one could argue that the gains seen in Afghanistan could have occurred without ISAF's involvement in health sector development at all or, at the very least, that ISAF's efforts are not the sole contributors to the witnessed improvement.

If the Special Inspector General for Afghanistan Reconstruction (SIGAR) estimates that donors spent over $92 billion on Afghan development, why does Afghanistan continue to face significant health challenges?[18] Afghanistan, which has not lacked monetary resources in its development, has lacked any significant coordination of

efforts. For example, Leonard Rubenstein, a Senior Scholar at the Center for Human Rights and Public Health at the Johns Hopkins Bloomberg School of Public Health noted:

> The military's civilian health initiatives, largely disconnected from the MOPH (Ministry of Public Health), are short term, ad hoc, and unsustainable, and to date have lacked a consistent rationale strategy, and have not been subject to evaluation.[19]

Unfortunately, this verdict is in direct opposition to Joint Publication (JP) 3-07, *Stability Operations,* which notes that the planning for heath sector interventions must link the "initial response activities of humanitarian relief, transformational activities, and activities that foster sustainability."[20]

This lack of coordination also extends to the number of governmental and non-governmental organizations (NGOs) who have sought to improve health services in the country:

> Even early on it was realized that coordination, and communication, between actors in all sectors was important but in practice these proved difficult to achieve. In November 2001, [the] WHO prepared an assessment of health needs and a 30-day operational plan focusing primarily on medical supplies and medical staff for UN Office for the Coordination of Humanitarian Affairs (OCHA). . . . However, there was limited participation by aid agencies and limited engagement with the Transitional Government of Afghanistan. Despite these limitations, the assessment was used to create the National Development Framework released by the Afghan Government in 2002.[21]

This fragmented approach in the development of health needs is a predetermined consequence of the lack of oversight and coordination in health sector development.

In a further exacerbation of this situation, there was little coordination between health sector assistance and the broader counter-insurgency strategy pursued by ISAF. Although a laudable concept, the Provincial Reconstruction Teams (PRTs) failed to provide any significant measurable success in facilitating healthcare systems with sustainable improvements in population health. This occurred despite the fact that the

design of the PRT was to help improve stability by "building up the capacity of the host nation to . . . deliver essential public services such as security, law and order, justice, health care, and education."[22] The organic medical capacity of the PRTs typically included a physician assistant, senior medical NCO, and two medics.[23] Although well organized to provide for the medical sustainment of the 50 to 100 man PRT itself, usually none of these medical personnel had any training or expertise in health system reconstruction.[24] PRTs in Afghanistan generally operated without MoPH guidance and tended to be "focused exclusively on short-term projects, lacked strategic objectives, and had no metrics to measure effectiveness."[25] Likewise, in the February 2011 *Afghanistan Provincial Reconstruction Team Handbook,* the only mention of improving healthcare delivery focused on two tasks: "facilitate medical training and mentorship for health care providers" and **"**refurbish medical care facilities."[26] Clearly, neither of these points will necessarily culminate in improved Afghan mortality rates nor are these tasks nested within larger countrywide public health initiatives.

Admittedly, Afghanistan has made some significant improvements in health sector performance since 2002, however this has been in spite of any coordination with ISAF health sector efforts and a broader counterinsurgency strategy. In 2003, the MoPH outlined the Afghan Basic Package of Health Services (BPHS) program that provided an initial direction in the prioritization of health resources. However, this prioritization was the conclusion reached by the MoPH, NGOs, and international donors with no input by ISAF on how such services should link with concurrent military strategy.[27] In 2005, the MoPH fully implemented the BPHS with a focus on seven areas of the health sector: maternal—newborn health, children's health and immunization, public nutrition,

communicable disease treatment and control (specifically TB, Malaria, and HIV), mental health, disability services, and ensuring regular supply of appropriate pharmaceuticals.[28] While these priorities were largely the appropriate ones for maximum health benefit to the people of Afghanistan, ISAF was not required, let alone mandated, to focus on these efforts. As such, the vast majority of the country which was largely too dangerous for humanitarian groups or government representatives to travel about, continued to have the only source of health-sector development come from localized projects by ISAF forces who held the necessary combat power to safely travel and operate in these contested areas.

COL Martin Bricknell, who served as the Medical Advisor (MEDAD) for Headquarters ISAF from 2006 to 2007, noted in the Journal of the Royal Army Medical Corps that ISAF did not have direct access to healthcare development funds.[29] In addition, the MEDAD only had the responsibility to assist PRTs in accessing background information on the MoPH policies and programs to ensure that any investment by the PRTs in the health sector conformed to local needs and national plans, which remained independent of an overall ISAF counterinsurgency strategy.[30] Likewise, the efforts of ISAF medical development focused on issues such as the certification and training of health professionals, balancing public and private sector health care, national medical procurement policy, emergency planning, and health sector contracting, of which none directly affect the wider Afghan populace to potentially dilute an insurgent-friendly population powerbase.[31]

Afghanistan has thoroughly demonstrated the consequences of failing to appropriately focus humanitarian efforts. For example, the *Afghanistan Case Study* noted,

"PRTs have in the past tended to focus on short-term projects in an attempt to achieve the maximum perceived impact in the shortest time, often driven by national [i.e. American] agendas."[32] This drive for immediate impact rather than sustainable and demonstrable improvements in population health led to the use of Medical Civic Action Programs (MEDCAPs) that proved to be detrimental to long-term health outcomes as the military provider introduced an unsustainable "free-at-the-point-of- use health care system" that subsequently eroded public trust in the local civilian healthcare providers.[33] It was not until July 2010 that ISAF finally released *Guidance on Military Medical Engagement in Health Sector Reconstruction and Development* (Standard Operating Procedure 1154), which finally discouraged MEDCAPs in the operating theater.[34] However, the subsequent re-branding of MEDCAPs as Village Medical Outreach Programs (VMOPs) still did not adequately address the lack of tying medical outreach to long-term health benefits as a policy across ISAF.

The ISAF Standard Operating Procedure (SOP) 1154, *Guidance on Military Medical Engagement in Health Sector Reconstruction and Development*, noted explicit recommendations for military involvement in the Afghanistan health sector. Specifically, the document stressed that civilian authorities (specifically the Afghan MoPH) had the primarly responsibility for engagement in health activities. Additionally, coalition military forces were to play only a supportive role under specific circumstances, such as when directly asked by civilian authorities.[35] Despite SOP 1154, a number of civilian agencies brought concerns to the ISAF MEDAD during "The Military and Health Sector Development" conference in Afghanistan in July 2010. Specifically, it was noted that military actors established health facilities without MoPH guidance in areas that did not

conform with the national health plan, donated medical equipment and pharmaceuticals that were not in accordance with MoPH guidelines, and that MEDCAP activities raised the population's expectation beyond that which the national health system could actually provide.[36]

As noted by LTC Michael Tarpey, MD, ISAF forces achieved isolated success when medical activities nested within Afghan MoPH priorities under the BPHS and targeted the development of relationships while "building capacity, improving governance, and tying the population to their government."[37] However, the inability to leverage the BPHS program in areas of Afghanistan where need was the greatest serves to illustrate the relationship that security plays in setting the conditions for civilian-driven healthcare initiatives to take root. In these uncertain security environments, healthcare development was assumed by the military forces in the region, which often did not happen until after the first six or seven years of conflict.[38] The lack of direction in Afghan health-sector development, resulting from gaps in existing military doctrine, misplaced priorities, and failures to coordinate with civilian programs, contributed to the disconnect observed between billions of aid dollars spent and the mediocre health metrics reflective of overall Afghan well being.

Disease Control Theory for Low and Middle Income Countries

The World Bank has established income categories for countries to serve as analytical measures. The basis for these categories is the gross national income (GNI) per capita with low, low-middle, and high-middle income nations defined as $1,035 or less, $1,035 to $4,085 and $4,086 to $12,615 respectively.[39] Given these parameters, the

World Bank refers to Low and Middle Income Countries (LMICs) as developing nations.[40]

Since 1950, life expectancy in the median-income countries has converged with those of high-income nations.[41] This reduction in health inequality is at odds with the observed long-term increases in income inequality between countries.[42] Therefore, the remaining health disparities seen in the world cannot be wholly blamed on existing income variances. Indeed, historical examples cite significant health improvements without concomitant increases in personal income.[43] Thus, income growth, in and of itself, cannot sustain improvement in a population's health. A far more important driver of improving health in developing nations is the ability of technical progress to stimulate the diffusion of health knowledge. Additionally, current interventions that can improve health, such as vaccination, are powerful and inexpensive enough that health conditions can be reasonably good even in developing nations provided those interventions can reach the people at need.[44]

In attempting to determine how to best intervene in the health sector in developing nations, the assumption that assistance from outside entities is beneficial must first be substantiated. As reported by Dr. Dean Jamison:

> Development assistance, wisely focused, has the potential for unusual effect. First, because health gains for the poor can be relatively inexpensive (compared to the cost of achieving significant effect in other sectors), development assistance itself can achieve much, particularly if it serves as a channel for diffusion of new technologies and best practices. Second, evidence suggests that development assistance in health can be more effective than other development assistance in poor policy and weak institutional environments. Third, the economic benefits of investing in health can be exceptionally high. Finally, because research and development have had high impact and are an international public good, development assistance has a particular comparative advantage in ensuring their finance.[45]

Thus, health sector development is not only valuable from the standpoint of individual well being, but also from spillover effect where this intervention also assists fragile governments and unstable economies. These findings also correspond to the experience of the DoD in the conduct of previous civil-military operations where the use of medical assets to provide health support activities has historically proven to be a valuable, low-risk asset.[46]

With health-sector intervention being a validated method for improving the developing world, what is the appropriate method for its application? While previous mention noted a number of inexpensive applications to reduce mortality and improve health, there also exist a number of ways that can, although well intentioned, absorb a massive budget without a corresponding significant return.[47] The deciding factor between the two is intervention selection.

In an effort to prioritize health intervention investment, the World Bank, the WHO, and the Harvard School of Public Health developed the Disability Adjusted Life Year (DALY) in 1988.[48] The DALY provides a quick reference for disease burden, or the cost that a given medical condition places upon a society, by quantifying the years of healthy life lost due to premature death and disability.[49] The DALY, therefore, presents a single measurement that allows a comparable metric for measuring the impact of a wide range of disease conditions, like cancer versus depression.[50] This in turn allows for a more accurate picture of the factors that drive poor health in a region, which would otherwise go unnoted by tracking a metric such as deaths alone.

Notably, as people live longer and healthier, the DALYs shift from communicable diseases (like malaria and tuberculosis for example), to non-communicable diseases (such

as heart attacks and strokes). As of 2010, Afghanistan was notable in having the lowest percentage of DALYs due to non-communicable diseases in Asia.[51] This means that the main drivers of morbidity and mortality are due to communicable, nutritional, maternal, and newborn causes (outside of injuries due to the ongoing war), and thus, serve as prime areas for future health sector assistance.[52]

Why the Department of Defense and Specifically, the Army?

When assessing the healthcare needs of a society, a logical question to ask is why should the Army, as a component of the DoD, be involved in the generation of health capacity at all, as noted in the aforementioned efforts in Afghanistan? This is a particularly valid query when one takes into account the panoply of agencies that serve developing and war-torn countries. These include intergovernmental organizations (IGOs) such as the United Nations and its sub-agencies like the World Health Organization (WHO), World Bank, and the United Nations High Commissioner for Refugees (UNHCR). This also includes United States governmental organizations, such as the Department of State and the United States Agency for International Development (USAID). Finally, mention of non-governmental organizations (NGOs) such as The International Red Cross—Red Crescent and Médecins Sans Frontières (Doctors Without Borders) only scratches the surface of the hundreds of potential agencies that may be at work in a region. For perspective, as of April 2013, there were approximately 250 NGOs functioning in some capacity in Afghanistan.[53]

The 1994 "Oslo Guidelines" initially described the recommendations regarding the use of foreign military and civil defense assets in the assistance of disaster relief.[54] JP 3-29, *Foreign Humanitarian Assistance*, summarizes the Oslo Guidelines by

describing that military forces may be used to provide humanitarian assistance when there is no appropriate civilian alternative and when a critical humanitarian need exists where a military asset provides both a unique capability and availability not present in the civilian sector.[55] These efforts may include direct or indirect assistance to the civilian population, as well as general humanitarian support to unified action partners.[56]

Further clarification of the Army's role in assisting humanitarian efforts must first begin with a doctrinal foundation. Army Doctrine Publication (ADP) 3-07 defines stability operations as:

> An overarching term encompassing various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief.[57]

Stability operations compose one of four types of operations that the Army can perform, with the remaining being offense, defense, and defense support to civilian authorities (which occurs only in the domestic United States). The focus of stability operations is in five areas: security, justice and reconciliation, humanitarian and social well-being, governance and participation, and economic stabilization and infrastructure.[58] Stability operations may also be performed as a sub-task to any type of Army operation, and more specifically, as part of a broader counterinsurgency strategy. A component of stability operations includes Foreign Humanitarian Assistance (FHA), which consists of DoD activities that directly relieve or reduce human suffering, disease, hunger, or privation.[59] Furthermore, JP 4-02, *Health Service Support*, clarifies medical stability operations as "supporting efforts to establish or restore medical support necessary to sustain the population until local civil services are restored."[60] Such operations also include the

application of civil-military medicine, where public health and medical issues involve a civil-military interface.[61]

With this foundation, there are two basic reasons the DoD must take primacy in stability options; the first is DoD policy. Specifically, DoD Instruction 3000.5 states:

> Stability operations are a core U.S. military mission that the Department of Defense shall be prepared to conduct with proficiency equivalent to combat operations.[62]

DoD Instruction 6000.16 further clarifies policy as it directly relates to Medical Stability Operations (MSOs) as:

> MSOs are a core U.S. military mission that the DoD Military Health System (MHS) shall be prepared to conduct throughout all phases of conflict and across the range of military operations, including in combat and non-combat environments.[63]

The second pertinent reason that the DoD is essential to stability operations is that the DoD, and more specifically the Army, may be the only organization that can physically operate on the ground due to the security situation present. JP 3-29, *Foreign Humanitarian Assistance*, classifies operational environments as permissive, uncertain, or hostile. It is in the uncertain and hostile security environments that initial stability efforts will likely be accomplished using DoD assets rather than civilian unified action partners.[64] Therefore, with the above DoD policy establishing stability operations on par with warfighting efforts, it is also important to establish parameters for when the DoD, and the Army in particular, should lead medical reconstruction and humanitarian efforts as opposed to one the aforementioned civilian organizations listed above.

Combat, without exception, is volatile, violent, and dangerous. As such, organizations with humanitarian expertise typically lack the capability to safely operate in the hostile or uncertain security environment. It is also important to emphasize that

stability operations span the breadth of both combat and non-combat operations. This broad-brush approach requires flexible medical assets that can provide Primary Health Care (PHC) assistance in areas that may have undergone a natural disaster or are chronically economically disadvantaged, to burgeoning or established insurgencies and even full-blown conventional ground combat. With this operating environment in mind, the DoD has acknowledged that it will likely be the first, and possibly the only, organization to respond to a given crisis. This does not imply that the military anticipates to work as a sole actor, as DoD policy states that military assets will:

> Lead stability operations and activities to establish civil security and civil control, restore essential services, repair and protect critical infrastructure, and deliver humanitarian assistance until such time as it is feasible to transition lead responsibility to other US government agencies, foreign governments and security forces, or international governmental organizations.[65]

With the DoD established as a leading force in initial stability operations, which includes medical and humanitarian support, the desired national-security outcomes from such operations requires clarification. While these operations clearly extend throughout the continuity of conflict, they all carefully aim at the civilian populace. This is because, as JP 3-07 explains, the restoration of essential services in a fragile area is a critical component to regaining security.[66] With this in mind, the desired outcome gains fidelity, specifically, either the prevention of an insurgency (whether in a weakened state or following intense ground combat operations), or the defeat of an established insurgency. In either scenario, the application of such assets is nearly identical, and given the recent history of combat operations in both Iraq and Afghanistan, understanding the origins of such conflict and the role of the population is essential in knowing how to appropriately apply medical expertise to also facilitate the broader counterinsurgency objectives.

Strategy for Defeating an Insurgency

Defining the operational environment of an insurgency is necessary prior to developing a viable counter-insurgency and nation-building strategy. First, a guerilla movement must establish an atmosphere in which his cause can flourish. As noted by Robert Taber in his work, *War of the Flea*:

> Politically, he [the guerilla] must seek to aggravate such social and political dissention as exists and to raise the level of political consciousness and of revolutionary will among the people.[67]

It is important to emphasize that this environment typically mandates that the center of gravity of the operation is not terrain, enemy leadership, or enemy forces as in more traditional, conventional conflicts. Rather, often the people of a given area compose the basis for success or failure in a counterinsurgency fight, particularly in a population-centric strategy. In situations where the civilian populace is not the center of gravity, such as that seen where an enemy-centric strategy takes precedence, the people still represent a critical requirement, and often a critical vulnerability, to the enemy insurgent's ability to successfully conduct operations. In his primer on conducting an insurgency, MAJ H. Von Dach surmises this situation concisely in *Total Resistance* with "the population is your greatest friend."[68] Likewise, David Kilcullen defines this concept with more granularity in his seminal work, *Counterinsurgency* as:

> The center of gravity of an insurgent movement–the source of power which it derives its morale, its physical strength, its freedom of action, and its will to act–is its connectivity with the local population in a given area.[69]

Thus, it is imperative to exploit all avenues that positively influence the population, which can in turn endorse the legitimacy of the host government and thereby remove the powerbase that fuels the guerilla fighting spirit.

In this environment, a counterinsurgency force can only achieve stability with the consent of the people. This does not mean that concurrent combat operations are not undertaken to target and eliminate guerilla forces. Quite the contrary, lethal and non-lethal options are necessary to eliminate the support base for an insurgency, destroy the enemy's ability to wage further combat, and ultimately, defeat the enemy's will to continue his struggle. Kilcullen further notes that:

> This [counterinsurgency] is a competition for control, and the side that best establishes a resilient, full-spectrum system of control that can affect security, rule of law, and economic activity at the local level is most likely to prevail.[70]

Indeed, David Galula cites in *Counterinsurgency Warfare: Theory and Practice*, that a synergy is required between combat forces destroying guerilla elements and the supporting efforts of building an effective judiciary as well as establishing an constructive contact with the citizenry where:

> The expected result–the final defeat of the insurgents–is not an addition but a multiplication of these various operations; they are all essential and if one is nil, the product will be zero.[71]

The demonstrable improvement in people's lives, along with the destruction of the enemy, is the recipe for success against guerilla forces. Under this premise, "the population, therefore, becomes the objective for the counterinsurgent as it was for his enemy."[72] This whole of government approach models the incorporation of all United States governmental capabilities mentioned in FM 3-24, *Insurgencies and Counter Insurgencies*. Specifically, only via the planning, coordination, and integration of unified action partners can the achievement of the desired national objectives against an insurgent enemy be possible.[73]

The linking of military operations to social and humanitarian programs tailored to fit an overarching political strategy is not unprecedented. While Hezbollah's organization and composition do not follow the standard concept of an irregular guerilla force, they have demonstrated the ability to congeal as a hybrid threat to both the Israeli Defense Forces and the Lebanese Army. Current Army doctrine defines these hybrid threats as "the diverse and dynamic combination of regular forces, irregular forces, and/or criminal elements all unified to achieve mutually benefitting effects."[74] It is under this construct that Hezbollah subsequently gains freedom of maneuver and effectiveness via the direct support of the population in Southern Lebanon.

In May of 2004, within days of the Israeli withdrawal, Hezbollah drove "from village to village in nine modern mobile clinics and sent in doctors and nurses to run an additional nine stationary clinics."[75] These efforts in humanitarian assistance were vast, with the medical interventions included in a broader campaign that included varied services such as ensuring clean drinking water, agricultural assistance, and even mosquito spraying.[76] The local populace met these efforts with enthusiasm. For example, following Hezbollah's aid to Bint Jbail Hospital, the Lebanese Minister of Public Health, Dr. Karam, stated, "the ones who came immediately to establish order were Hezbollah. They are organized and they are fast."[77] Reportedly, even the Christian minorities appreciated the efforts of Hezbollah when a local Christian civilian stated, "the whole picture has changed from black to white, from what we used to hear about what Hezbollah would do to us to what we now are feeling."[78]

Hezbollah, following the 2006 war in Southern Lebanon, continued to illustrate this effective strategy of using humanitarian aid to advance their objectives. Immediately

following the 2006 conflict, Hezbollah provided assistance in education, healthcare, loans, and other forms of social aid to solidify its support among the civilian populace.[79] These humanitarian actions extended even beyond the traditional Shi'ite Muslim community to include Christians living in the area who "chose Hezbollah's medical services on the basis of quality and cost."[80] Through the use of both humanitarian efforts and effectively providing local security as described by Hezbollah's slogan "the hand that fights, the hand that builds," the organization has effectively replaced the Lebanese state as the source of authority and governance in Southern Lebanon.[81] With this base of support, Hezbollah has the flexibility necessary to pursue activities that ironically directly threaten the populace as well, to include placing Katyusha rockets within the very homes of the Lebanese civilians they provide this vast array of social services to.[82] The end result of Hezbollah's public assistance has been the engendering of "a deep loyalty among Shi'ites, who for years were the country's underclass and whose sense of pride and identity are closely intertwined with Hezbollah."[83] Indeed, as one recipient of Hezbollah charity expressed, "Hezbollah is people. People are Hezbollah."[84]

Although Lebanon is a relatively modern and diverse nation, making analysis of specific health indices difficult (and hence the impact Hezbollah's health outreach effects), evaluation of several key indications reveals a series of impressive disparities between it and, for example, Afghanistan. Of note, the average life expectancy in Lebanon is 81.5 years (compared to Afghanistan's 61.5).[85] Likewise, Lebanon notes an access to improved water sources rate of 98 percent and an access to improved sanitation sources rate of 100 percent, which are 1.5 and 3.5 times higher, respectively, than Afghanistan even after 12 years of ISAF involvement.[86] In general, Lebanon exceeds

every metric of population health when compared to Afghanistan, and although Lebanon cannot be described as the most stable government in the Middle East, it is noteworthy particularly given that this information also reflects the 900,000 Syrian refugees in the country at the time these most recent statistics were collected.[87]

How Should Improvement be Judged?

Joint Publication 3-0, *Joint Operations*, states that during military operations assessments must occur in order to both evaluate changes in the environment and the progress that a force has made towards mission accomplishment.[88] Broad assessments occur at the operational and strategic levels of war, and while tactical assessments also occur, the definition of measures of performance (MOPs) and measures of effectiveness (MOEs) to achieve a given task are the responsibility of the supervising operational or strategic headquarters.[89] Therefore, while the physical activities of gathering data to form an assessment typically happen at the tactical level, the operational and strategic command must first have an integrated assessment plan established that links assessment activities and measures in order to gauge progress.[90]

The core of the assessment process involves the task of evaluating. Per Army Doctrine Reference Publication (ADRP) 5-0, *The Operations Process*, evaluating is "using criteria to judge progress toward desired conditions and determining why the current degree of progress exists."[91] Evaluation, in turn, assists commanders in determining what is and is not working, while also gaining insights into how to best accomplish the mission.[92] MOPs and MOEs serve as criteria to aid in determining relative progress towards end state conditions, achieving objectives, and performing tasks.[93] As best summarized by JP 3-0 (and reiterated in ADRP 5-0), MOEs determine if

the force is "doing the right things" to achieve its objectives, while MOPs simply determine if the force is "doing things right."[94] It is also important to emphasize that MOEs and MOPs are simply criteria and do not represent the entirety of the assessment in and of themselves. Additional relevant information, in the form of indicators, are required to supplement MOEs and MOPs for the conduct of a thorough evaluation.[95]

Furthermore, a MOE can measure both positive and negative changes in conditions overall. Typically, MOEs are monitored using formal assessment plans. A MOP, on the other hand, confirms or denies that an organization performed a task properly. MOPs, unlike MOEs, are often tracked at all levels and focus exclusively on the friendly force. In this manner, organizations typically evaluate MOPs in a relatively straightforward way that results in a yes or no answer (i.e. a task was or was not completed).[96] Another critical piece of information necessary for the evaluation process is the indicator. Indicators can take on a variety of forms, but regardless of how they are collected, their purpose is to help clarify the current status of a given MOE or MOP.[97]

For example, if a force received the task of improving the overall health of a given population during a stability operation, a MOE may be "reduce childhood mortality." Corresponding MOPs may be "conduct Key Leader Engagements (KLEs) with local health officials," or "facilitate mosquito bed-net distribution by NGOs." Finally, an indicator could be "number of pediatric hospital admissions per week."

In current United States Army doctrine, there are no recommendations for MOEs in regards to facilitating medical stability operations. For example, FM 4-02, *Army Health System*, sole mention of PHC facilitation is the recommendation to provide "medical expertise and consultation to enhance building partnership capacity in public,

private, and military health sectors of the host nation."[98] When examining the Department of the Army Mission Essential Task Lists (METL) for brigade-sized elements, no Army Medical Department unit has a host-nation healthcare support activity listed as part of their respective METL. This is due to the fact that units under the control of the deployed Medical Command (MEDCOM) are not responsible for the physical battle space; rather they exist to act as a supporting unit to the forces within the greater task force.

The only organizations that do have a METL task associated with medical stability operations are battle space owners, specifically the Brigade, Division, and Corps-sized maneuver units that have task 71-8-7377, *Coordinate Medical Stability*, explicitly stated.[99] This METL task states that, with the coordination of the medical command or medical brigade in the area, the surgeon cell of a brigade or higher echelon unit in conjunction with the host nation shall "coordinate health service support to establish, enhance, maintain, or influence relations between the military force and host nation governmental authorities, non-governmental organizations, and the civilian populace."[100] This corresponds with JP 3-57, *Civil-Military Operations,* where it states that the Joint Force Surgeon is responsible for the health support activities to include medical stability operations and humanitarian assistance.[101] While the METL lists five separate "Performance Measures" (some with up to 30 additional sub-measures) that could serve as potential MOPs, there are no recommendations present for MOEs.[102]

At higher echelons, the doctrinal gap persists. The Army Universal Task List (AUTL) notes under ART 7.3.3 Restore Essential Services only two pertinent collective tasks: 7.3.3.7 *Conduct Medical Stability Operations* and 7.3.3.8 *Support Public Health*

Operations.[103] Similarly, the AUTL offers 12 potential MOPs such as "repair and rebuild hospitals and clinics" and "evaluate water sources," while offering no additional guidance for the desired end state.[104] Lastly, the strategic level doctrine offers no specified tasks at all for medical stability operations within the Universal Joint Task List (UJTL).

JP 3-29, *Foreign Humanitarian Assistance*, notes that given the uniqueness of each specific operation, there is no singular established method for developing MOEs.[105] JP 3-07, *Stability Operations*, does endorse the need for MOEs in a humanitarian assistance operation, but states that the foundation for selecting appropriate MOEs is the Sphere Project Humanitarian Charter.[106] Interestingly, the corresponding reference, *The Sphere Handbook*, is "designed for use in disaster response, and may also be useful in disaster preparedness and humanitarian advocacy."[107] While there is applicability in *The Sphere Handbook* to areas of conflict, the recommendations of maintaining "the crude mortality rate (CMR) at, or reduced to, less than twice the baseline rate documented for the population prior to the disaster" is not likely to provide effective guidance to a corps, division, or brigade-sized maneuver element.[108] This absence of doctrine serves to illustrate the disparity seen in Afghanistan where ISAF expended vast amounts of money supporting various MOPs, without affecting the overall health status of individual Afghans due to the failure of identifying the appropriate corresponding MOEs.

Measures of Effectiveness are critical in determining whether the Lines of Effort (LOEs) for a stability operation are achieving the desired outcome. As described by FM 3-07, *Stability Operations*, LOEs correspond to an over-arching stability mechanism, which is the primary method friendly forces affect civilians in order to attain conditions that support establishing peace.[109] The stability mechanism of support encompasses the

efforts to improve the health capacity of an indigenous population. Support, as defined by FM 3-07, involves "establishing, reinforcing, or setting the conditions necessary for the other instruments of national power to function effectively; coordinating and cooperating closely with host-nation civilian agencies; and assisting aid organizations as necessary to secure humanitarian access to vulnerable populations."[110] Additionally, in a counterinsurgency, stability mechanisms aid enemy defeat mechanisms that are defined in terms of the broad operational and tactical effects they produce, either physical or psychological. For example, in a counterinsurgency scenario, the stability mechanism of support, when leveraged effectively, may serve to segregate the population from the guerilla, thereby supporting the defeat mechanism of isolate, which FM 3-07 defines as limiting the enemy's ability to influence events or marginalizing an enemy's critical capabilities.[111] Figure 1 provides a visual depiction of this process:

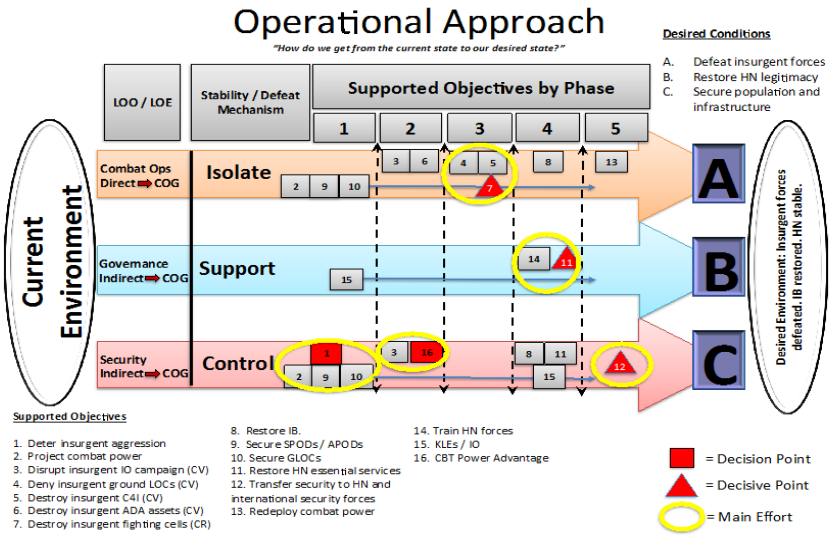

Figure 1. Example Lines of Effort for a Counterinsurgency

Source: Created by author.

Before identifying which factors can serve as effective MOEs to document overall health improvement in a given scenario, it is imperative to further clarify the operational environment that an organization targeting healthcare improvement will be expected to function in. The ultimate goal is to support the overall political end-state for a given mission. More often than not, the goal of stability operations (either explicit or implicit) will be improving the legitimacy of a host-nation government in order to either prevent instability from developing into an insurgency or to target the populace in order to remove the foundation of support to an existing insurgent movement. Improvement in population health drives to the very heart of David Kilcullen's underlying philosophy in *Counterinsurgency* with "every time you help someone, you hurt someone else–not least the insurgents."[112] Therefore, the primary issue that must be addressed is who should be helped in order to make the largest improvement in overall population health that will in-turn have the greatest impact the enemy's powerbase?

Conveniently, this is where both population health metrics and the philosophy of Kilcullen merge. Again, from *Counterinsurgency*:

> Win the women, and you own the family unit. Own the family, and you take a big step forward in mobilizing the population.[113]

Social and economic factors are the primary drivers of both maternal and pediatric health because the mother-child unit is the most susceptible segment of the population to the health-related effects of poverty, contaminated water, nutritional deficiency, violence, and endemic disease.[114] Therefore, with close monitoring of these two segments of the population, a window into the overall status of population wellbeing can be gleaned, and thus the progress of a counterinsurgency effort as a whole. As such, the pursuit of metrics

aimed at the mother-child unit in the form of MOEs may generate the maximum benefit for a given populace, thus incurring the maximum impact on the civilian center of gravity and providing an economy of force measure in a dangerous, austere environment with limited resources. Mother-child parameters also mirror the areas of emphasis determined by the WHO and have been proven to show positive change when political stability is achieved, economic conditions improve, and when basic essential health care is established.[115]

This focus on specific metrics differs somewhat from current United States Army doctrine. Army Training Publication (ATP) 3-07.5, *Stability Operations*, notes that stability operations occur in three phases: initial, transformational, and final—fostering sustainability, with public health efforts being included under one of five stability tasks, specifically, the restoration of essential services.[116] These phases occur within the broader scope the shape, clear, hold, build, and transition framework of COIN, which may also include offensive and defensive actions simultaneously to stability operations.[117] Per the doctrine, in the initial phase of a stability operation, the evaluation of health needs occur through assessing hazards and infrastructure, evaluating the need for additional assets, repairing and operating existing medical facilities, and vaccination.[118] The transformational stage focuses these efforts and includes the additional tasks of the support to waste management and the promotion of medical infrastructure.[119] Lastly, in the final or fostering stability phase, the Army task list culminates in the transfer of responsibility to the host nation, supporting host nation improvements, and monitoring and reporting the process.[120]

While ATP 3-07.5 accurately describes the areas that Army assets can influence a population's health sector, this approach does not adequately describe the "why" such measures are performed. JP 3-57, *Civil-Military Operations*, alludes to a purpose by stating "the principle goal of civil-military operations in COIN . . . is to isolate the insurgents from the populace, thus depriving them of recruits, resources, intelligence, and credibility."[121] More specifically, if the COIN force chooses particular health metrics as MOEs instead, it re-frames the discussion so that the decision to intervene in support of host-nation health care targets the population for maximum benefit. The "how" an intervention should be performed (and thus taking into account the variables involved in each specific situation) is then delegated to the individual unit undertaking the action under the premise of the military principle of mission command, or giving subordinate leaders the maximum amount of initiative in the conduct of military operations.[122] Therefore in summary, if appropriate MOEs can be identified, which must nest with the goals of civilian aid agencies that will assume the follow-on mission, the subordinate indicators can then be determined along with the corresponding MOPs so that the maximum health benefit can be applied to a population at need.

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[1] Afghanistan Ministry of Public Health, "Islamic Republic of Afghanistan Ministry of Public Health Annual Report 1387," last modified 2009, accessed February 22, 2014, http://moph.gov.af/Content/Media/Documents/HNSS-Report-ENG-v4-1281220101156987.pdf.

[2] Central Intelligence Agency (CIA), "Afghanistan," World Factbook, last modified January 28, 2014, accessed February 15, 2014, https://www.cia.gov/library/publications/the-world-factbook/geos/af.html.

[3] Ibid.

[4] World Health Organization Eastern Regional Mediterranean Office, "Afghanistan Health Profile," last modified 2012, accessed February15, 2014, http://rho.emro.who.int/rhodata/?theme=country.

[5] Ibid.

[6] Dr. Ala Alwan, "Demographic, Social and Health Indicators for Countries of the Eastern Mediterranean," World Health Organization Eastern Regional Mediterranean Office, 2013, 10, accessed February 16, 2014, http://applications.emro.who.int/dsaf/EMROPUB_2013_EN_1537.pdf.

[7] Ibid.

[8] World Bank, "Improved Water Source (percent of population with access)," accessed June 1, 2014, http://data.worldbank.org/indicator/SH.H2O.SAFE.ZS.

[9] World Bank, "Improved Sanitation Facilities (percent of population with access)," accessed June 1, 2014, http://data.worldbank.org/indicator/SH.STA.ACSN?page=2.

[10] Emma Graham-Harrison, "Prevalence of Malnutrition in Southern Afghanistan 'Shocking'," *The Guardian*, September 4, 2012, accessed June 1, 2014, http://www.theguardian.com/world/2012/sep/04/malnutrition-southern-afghanistan-shocking-levels.

[11] Central Intelligence Agency (CIA), "GDP Per Capita Comparison," World Factbook, accessed March 2, 2014, https://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html.

[12] United Nations, "We Can End Poverty: Millenium Development Goals and Beyond 2015," accessed March 2, 2014, http://www.un.org/millenniumgoals/.

[13] World Bank, "Mortality rate, under-5 (per 1,000 live births)," accessed June 1, 2014, http://data.worldbank.org/indicator/SH.DYN.MORT.

[14] World Health Organization Global Health Observatory, "Under-five Mortality," accessed March 2, 2014, http://www.who.int/gho/child_health/mortality/mortality_under_five_text/en/.

[15] Dean T. Jamison, M. E. Sandhu, and J. Wang, *Working Paper No. 21, Disease Control Priority Project, Why Has Infant Mortality Decreased at Such Different Rates in Different Countries?* (Washington, DC: US National Institutes of Health, February 2004), 28-30, accessed March 2, 2014, http://www.dcp2.org/file/36/wp21.pdf.

[16] Ibid.

[17] Kingsley Davis, "The Amazing Decline of Mortality in Underdeveloped Areas," *The American Economic Review* 46, no. 2 (May 1956): 314.

[18] Jacob Siegel and Hanqing Chen, "The Afghan Money Pit: How Millions of Dollars Were Wasted," *The Daily Beast*, last modified October 30, 2013, accessed February 15, 2014, http://www.thedailybeast.com/the-hero-project/articles/2013/10/30/the-afghan-money-pit-how-millions-of-dollars-were-wasted.html.

[19] Vanessa Kerry, *The Afghanistan Case Study* (Harvard, MA: Harvard University, 2013), 13.

[20] Joint Chiefs of Staff, Joint Publication (JP) 3-07, *Stability Operations* (Washington, DC: Government Printing Office, September 2011), III-26.

[21] Ibid., 14.

[22] Center for Army Lessons Learned, *Afghanistan Provincial Reconstruction Team Handbook: Observations, Insights, and Lessons* No. 11-16 (Fort Leavenworth, KS: Center for Army Lessons Learned, February 2011), 2.

[23] Michael J. Tarpy, "The Role of the U.S. Army in Health System Reconstruction and Development During Counterinsurgency" (Master's Thesis, United States Army Command and General Staff College, Fort Leavenworth, KS, 2012), 89.

[24] Ibid.

[25] Ibid., 88.

[26] Center for Army Lessons Learned, *Afghanistan Provincial Reconstruction Team Handbook*, 49.

[27] Islamic Republic of Afghanistan Ministry of Public Health, "A Basic Package of Health Services for Afghanistan," 1, accessed February 22, 2014, http://moph.gov.af/Content/Media/Documents/BPHS-2005-FINAL29122010162945969.pdf.

[28] Ibid.

[29] COL Martin Bricknell, DM, "Reflections on Medical Aspects of ISAF IX in Afghanistan," *Journal of the Royal Army Medical Corps* 153, no. 1 (2007): 49.

[30] Ibid.

[31] Ibid.

[32] Kerry, *The Afghanistan Case Study*, 25.

[33] Ibid., 20.

[34] Ibid.

[35] Maria Gabriella Arcadu, "Civil-Military Coordination in the Health Sector Afghanistan: A Case Study," September 2010, 6-5, accessed March 2, 2014, http://www.4change.eu/uploads/CM_CASE_STUDY_AFG_V3_2.pdf.

[36] Ibid., 7-0.

[37] Tarpy, "The Role of the U.S. Army in Health System Reconstruction and Development During Counterinsurgency," 105.

[38] Ibid., 107.

[39] World Bank, "How We Classify Countries," accessed April 27, 2014, http://data.worldbank.org/about/country-classifications.

[40] Ibid.

[41] Jamison et al., *Disease Control Priorities in Developing Countries*.

[42] Ibid.

[43] Ibid.

[44] Ibid.

[45] Ibid.

[46] Joint Chiefs of Staff, Joint Publication (JP) 3-57, *Civil-Military Operations* (Washington, DC: Government Printing Office, September 2013), II-10.

[47] Ibid.

[48] World Health Organization, *National Burden of Disease Studies: A Practical Guide*, *Edition 2.0* (Geneva, Switzerland: WHO, October 2001), 9, accessed September 25, 2014, http://www.who.int/healthinfo/nationalburdenofdiseasemanual.pdf.

[49] Institute for Health Metrics and Evaluation (IHME), *The Global Burden of Disease: Generating Evidence, Guiding Policy* (Seattle, WA: IHME, 2013), 7, accessed June 2, 2014, http://www.healthdata.org/sites/default/files/files/policy_report/2013/GBD_GeneratingEvidence/IHME_GBD_GeneratingEvidence_FullReport.pdf.

[50] Ibid.

[51] Ibid., 20.

[52] Ibid.

[53] Jason Ferguson, "What Every Deploying Doc Should Know About: Relationships with NGOs," *The Uniformed Family Physician* 7, no. 2 (Winter 2014): 18.

[54] Consultive Group on the Use of Military and Civil Defense Assets, "Guidelines on the Use of Foreign Military and Civil Defense Assets in Disaster Relief–'Oslo Guidelines'," November 2007, 1, accessed September 29, 2014, http://www.refworld.org/pdfid/47da87822.pdf.

[55] Joint Chiefs of Staff, Joint Publication (JP) 3-29, *Foreign Humanitarian Assistance* (Washington, DC: Government Printing Office, January 2014), III-7.

[56] Ibid.

[57] Department of the Army, Army Doctrine Publication (ADP) 3-07, *Stability Operations* (Washington, DC: Government Printing Office, August 2012), 11.

[58] Ibid.

[59] Joint Chiefs of Staff, JP 3-29, *Foreign Humanitarian Assistance*, ix.

[60] Joint Chiefs of Staff, Joint Publication (JP) 4-02, *Health Service Support* (Washington, DC: Government Printing Office, July 2012), xv.

[61] Ibid.

[62] Department of Defense, Department of Defense Instruction (DoDI) 3000.5, *Stability Operations* (Washington, DC: Government Printing Office, September 2009), 2, accessed February 18, 2014, http://www.dtic.mil/whs/directives/corres/ pdf/300005p.pdf.

[63] Department of Defense, Department of Defense Instruction (DoDI) 6000.16, *Military Health Support for Stability Operations* (Washington, DC: Government Printing Office, May 2010), 2, accessed February 18, 2014, http://www.dtic.mil/whs/directives/corres/pdf/600016p.pdf.

[64] Joint Chiefs of Staff, JP 3-29, *Foreign Humanitarian Assistance*, xiii.

[65] Department of Defense, DoDI 3000.5, *Stability Operations*, 2.

[66] Joint Chiefs of Staff, JP 3-07, *Stability Operations*, III-52.

[67] Robert Taber, *War of the Flea* (Washington, DC: Potomac Books, 2002), 19.

[68] Major H. Von Dach, *Total Resistance* (Boulder, CO: Paladin Press, 1965), 20.

[69] David Kilcullen, *Counterinsurgency* (Oxford: Oxford University Press, 2010), 7.

[70] Ibid., 30.

[71] David Galula, *Counterinsurgency Warfare: Theory and Practice* (Westport, CT: Praeger Security International 2006), 61.

[72] Ibid., 52.

[73] Department of the Army, Field Manual (FM) 3-24, *Insurgencies and Counter Insurgencies* (Washington, DC: Government Printing Office, May 2014), 1-12.

[74] Department of the Army, Training Circular (TC) 7-100, *Hybrid Threat* (Washington, DC: Government Printing Office, November 2010), v.

[75] Susan Sachs, "Hezbollah Offers a Helping Hand in Southern Lebanon," *The New York Times*, May 31, 2000, accessed March 4, 2014, http://www.nytimes.com/ 2000/05/31/world/hezbollah-offers-a-helping-hand-in-southern-lebanon.html.

[76] Ibid.

[77] Ibid.

[78] Ibid.

[79] Melani Cammett, "Habitat for Hezbollah," *Foreign Policy*, August 17, 2006, accessed February 17, 2014, http://www.foreignpolicy.com/articles/2006/08/16/ habitat_for_hezbollah.

[80] Ibid.

[81] Integrated Regional Information Network (IRIN), "Lebanon: The Many Hands and Faces of Hezbollah," *IRIN Humanitarian News and Analysis*, March 29, 2006, accessed February 22, 2014, http://www.irinnews.org/ report/26242/lebanon-the-many-hands-and-faces-of-hezbollah.

[82] Matt M. Matthews, *We Were Caught Unprepared: The 2006 Hezbollah-Israeli War* (Fort Leavenworth, KS: Combat Studies Institute Press, 2008), 17.

[83] Sabrina Tavernise, "Charity Wins Deep Loyalty for Hezbollah," *The New York Times*, August 6, 2006, accessed March 4, 2014, http://www.nytimes.com/2006/08/06/ world/middleeast/06tyre.html?pagewanted=all&_r=0.

[84] Ibid.

[85] Alwan, "Demographic, Social and Health Indicators for Countries of the Eastern Mediterranean," 10.

[86] Ibid., 5.

[87] United Nations High Commissioner for Refugees (UNHCR), "Syrian Regional Refugee Response," February 14, 2014, accessed February 17, 2014, http://data.unhcr. org/syrianrefugees/country.php?id=122.

[88] Joint Chiefs of Staff, Joint Publication (JP) 3-0, *Joint Operations* (Washington, DC: Government Printing Office, August 2011), II-10.

[89] Ibid.

[90] Ibid.

[91] Department of the Army, Army Doctrine Reference Publication (ADRP) 5-0, *The Operations Process* (Washington, DC: Government Printing Office, May 2012), 5-2.

[92] Ibid.

[93] Ibid.

[94] Joint Chiefs of Staff, JP 3-0, *Joint Operations*, II-10.

[95] Department of the Army, ADRP 5-0, *The Operations Process*, 5-2.

[96] Ibid.

[97] Ibid., 5-3.

[98] Department of the Army, FM 4-02, *Army Health System*, 6-10.

[99] Department of the Army, "Task 71-8-7377: Coordinate Medical Stability (Brigade-Corps)," accessed April 19, 2014, https://atn.army.mil.

[100] Ibid.

[101] Joint Chiefs of Staff, JP 3-57, *Civil-Military Operations*, II-10.

[102] Department of the Army, "Task 71-8-7377: Coordinate Medical Stability (Brigade-Corps)," accessed April 19, 2014, https://atn.army.mil.

[103] Department of the Army, Field Manual (FM) 7-15, *The Army Universal Task List* (Washington, DC: Government Printing Office, June 2012), 7-19.

[104] Ibid.

[105] Joint Chiefs of Staff, JP 3-29, *Foreign Humanitarian Assistance*, IV-6.

[106] Joint Chiefs of Staff, JP 3-07, *Stability Operations*, III-22.

[107] Sphere Project, *The Sphere Project: Humanitarian Charter and Minimum Standards in Disaster Response* (Geneva, Switzerland: Oxfam Publishing, 2004), 6.

[108] Ibid., 259.

[109] Department of the Army, Field Manual (FM) 3-07, *Stability Operations* (Washington, DC: Government Printing Office, October 2008), 4-7.

[110] Ibid.

[111] Ibid., 4-8.

[112] Kilcullen, *Counterinsurgency*, 44.

[113] Ibid., 40.

[114] Virginia Randall, "Maternal and Child Health in the Tropics," in *Hunter's Tropical Medicine and Emerging Infectious Diseases*, ed. Thomas G. Strickland, 8th ed. (Philadelphia, PA: W.B. Saunders Company, 2000), 125.

[115] Ibid.

[116] Department of the Army, ATP 3-07.5, *Stability Techniques*, 1-18.

[117] Department of the Army, FM 3-24, *Insurgencies and Counter Insurgencies*, 9-1.

[118] Ibid., 4-13.

[119] Ibid.

[120] Ibid.

[121] Joint Chiefs of Staff, JP 3-57, *Civil-Military Operations*, 1-15.

[122] Department of the Army, Army Doctrine Publication (ADP) 1, *The Army* (Washington, DC: Government Printing Office, September 2012), 2-4.

CHAPTER 3

RESEARCH METHODOLOGY

Chapter 2 evaluated the historical evidence on the impact of Afghan health following ISAF intervention. Chapter 2 also examined the established methods for health sector improvement in the developing world, the validity of addressing the medical needs of a population facing an insurgency, and the Army doctrinal foundation for intervening in health sector development. This chapter describes the methodology applied to answer the primary research question: what interventions by the United States Army are optimal in the development of host-nation health systems during counterinsurgency operations?

Dependent Variable Selection

In an effort to address this question adequately, the application of Analysis of Variance (ANOVA) and the Tukey Method sought to determine which factors that influenced health also related to insurgency. A primary assumption is that insurgency is analogous to pregnancy. In other words, it is either present or it is not. While a number of models exist to frame either failed states or the presence of conflict on a sliding scale that ranks nations in an ordinal fashion, these examples do not suitably address the presence of an insurgency in a state. Likewise, these models fail to differentiate the conflict present in a state as an insurgency or as violence applied in support of a coup, revolution, or civil war. The next issue at hand is therefore determining what countries have, or do not have, an insurgency present. In 2008, the RAND Corporation published "War by Other Means: Building Complete and Balanced Capabilities for Counterinsurgency."[1] This work generated 89 insurgencies from 1945 through 2008 by:

> Using a starter set of 127 insurgencies taken from James D. Fearon and David D. Laitin, "Ethnicity, Insurgency, and Civil War," American Political Science Review (Vol. 97, No. 1, February 2003, pp. 75–90), who defined them as internal wars where more than 1,000 were killed, with at least 100 on each side. To their list of 127, we added 11 insurgencies that passed the 1,000-dead mark after their data cutoff date of 1999, subtracted 51 insurgencies that were more in the nature of coups, countercoups, and spontaneous insurrections, and, made a few other adjustments.[2]

From the Rand list of 89 insurgencies, 14 were still be active in 2008 and included in this study.[3] In order to form a suitable country selection for analysis, 42 countries that were not experiencing an insurgency were included. These nations comprised 14 counties from each of the World Bank's income categories of low, middle, and high-income countries respectively (note, the low-middle and high-middle country differentiation by the World Bank was consolidated into one group for ease of analysis). Nation selection represented diverse geographic, demographic, and cultural variance. Thus, 56 total countries form the dependent variables for analysis.

Independent Variable Selection: Generating a Reflection of Medical Production Capacity

The selection of independent variables occurred using several processes. First, all independent variables used 2010 data (when available) as this data corresponds to the United Nations Millennium Development Goal interim report, which eased data collection (additionally, all of the 14 insurgencies were still active through 2009). Next, the production of medical services as a function of resources requires definition. For this study, the resources chosen reflect the traditional model of Adam Smith and his three factors of production: land, capital, and labor.[4] The incorporation of entrepreneurial ability acts as a fourth resource as advocated by economist Frank Knight.[5] The selection of metrics to represent these resources followed. Labor data is captured using the labor

force participation rate (the proportion of people ages 15 and above who are economically active and supply labor for the production of goods and services), capital by the GNI per capita (the GNI converted to U.S. dollars using the Atlas method and then divided by the midyear population), land by arable hectares per person (temporary land for crops, pasture, gardens, or is currently fallow) and finally entrepreneurial ability by the physician density per 1000 population (generalist and specialist practitioners).[6]

Independent Variable Selection: Potential Aid Interventions

The remaining independent variables selected were the under-five mortality rate (U5MR), measles vaccination coverage rate (as a percentage of children between 12 and 23 months), child malnutrition (percentage of children under 5 years-old who are underweight), the percentage of the population with access to improved water and sanitation sources, and lastly, the number of hospital beds per 1,000 population. With a range of potential statistical options to judge success by, it is necessary to clarify why the U5MR, immunization rate information, the percentage of underweight children, the percentage of the population with access to improved water and sanitation rates and the number of hospital beds available may be the optimal measures for assessing the overall health status and potentially, the priority of effort for initial aid.

From a military standpoint, if the goal of a counterinsurgency operation is to gain support amongst the civilian population, then the targeted areas for intervention should be those that affect the widest spectrum of the population. As mentioned previously in chapter 3, the most vulnerable segment of the population is the mother-child unit. This fact conveniently coincides with the operational desire in a counterinsurgency to engage

the widest segment of the society possible for maximum effect. In Afghanistan for example, 46 percent of the population is under 15 years old.[7] Assuming that women of reproductive age (15 to 49 years old) compose a minimum of 20 percent of the remaining population, then efforts to engage these two groups would effectively impact over two-thirds of the total civilian base.

Additionally, the potential aid interventions selected as independent variables reflect factors that drive high DALY producing conditions. For example, the top 25 causes of global DALYs in 2010 due to communicable, newborn, nutritional, and maternal causes were: lower respiratory infections (#2), diarrhea (#3), HIV—AIDS (#4), malaria (#5), preterm birth complications (#6), neonatal encephalopathy (#12), tuberculosis (#13), iron-deficiency anemia (#15), neonatal sepsis (#16), protein-energy malnutrition (#20) and meningitis (#25).[8] These high DALY problems also serve to exemplify the gaps in PHC present in a society. As such, these areas are of acute concern and most amenable to intervention by the United States Army as they also nest under WHO protocols, which can produce tangible benefits to a host-nation population.

The U5MR serves as the best general indicator for overall child wellbeing. The agreed definition of the U5MR by the United Nations (and subordinate agencies such as the WHO and UNICEF) is:

> The under-five mortality rate (U5MR) is the probability (expressed as a rate per 1,000 live births) of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates. A live birth is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life—such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles—whether or not the umbilical cord has been cut or the placenta is attached. Each product of such a birth is considered a live birth.[9]

Understanding the definition of the U5MR, the next task is to address the leading causes that contribute to the tragic elevation of the U5MR. As noted by the "Levels and Trends of Child Mortality in 2006" interagency working paper:

> Research and programme experience have made it clear what actions need to be taken. Most child deaths are preventable. Over half are due to communicable diseases, including pneumonia, diarrhoea, malaria, measles, and HIV/AIDS. Many other deaths are due to neonatal disorders, such as preterm delivery, asphyxia at birth, and neonatal pneumonia and sepsis. Undernutrition is also a contributing factor in most cases.[10]

Identifying these causes allows the determination of which interventions are best suited for addressing these underlying issues. Fortunately, "there is at least one effective and affordable intervention available to prevent or treat each major cause of under-five mortality."[11] Indeed, Gareth Jones, et al., noted in 2003 that the delivery of many of the most promising interventions can effectively occur in the household with minimal external assistance. These interventions included the promotion of breastfeeding, oral rehydration therapy, education on complementary feeding, and insecticide-treated materials, which, if applied jointly, could prevent up to one-third of all childhood deaths in developing countries.[12]

The U5MR thus drives the selection of the measles vaccine coverage rate and child malnutrition (reflected by the percentage of children underweight) as independent variables for study. Measles was selected as it is often the last vaccine given to children in the developing world (at 12 to 23 months). Therefore, the assumption is that if a child received this vaccination, then they likely received the preceding vaccines as well. Furthermore, the percentage of children underweight reflects both access to suitable food sources as well as exposure to chronic diseases that may mitigate appropriate weight gain. This metric also serves as an outcomes-based indicator for the presence of food

security, which the Food and Agriculture Organization (FAO) of the United Nations defines as the combination of food availability, economic and physical access to food, food utilization, and the stability of food to vulnerability and shocks over time.[13]

Obviously, with the understanding of the factors that drive the U5MR, applying humanitarian efforts toward vaccination rates and nutritional supplementation to affect the percentage of underweight children allows for clarity of effort during an initial humanitarian aid program. These more immediate and quantifiable interventions are important given the organizational pressures that were present during operations in Afghanistan. One criticism of humanitarian health care was that military actors were "inevitably focused on short-term interventions at the expense of the development of sustainability and capacity over the long-term."[14] This focus on short-term projects was due to demands on operational commanders to produce quantifiable results desired by higher headquarters, which illustrated a perception of progress.

While it is correct to question the logic of such decisions, it is also reasonable to assume that this corporate culture of the Army will likely persist, and that it is best to align the desired "ends" with an organization's psychological "ways." JP 3-08, *Interorganizational Coordination During Joint Operations*, acknowledges the fact that while military commanders seek immediate results, development agencies will often focus on addressing the underlying structural faults that plague a society.[15] JP 3-08 attempts to address this disparity with the recommendation that "military activity should support longer-term development objectives" and that military activities should be "better synchronized and complement the work of the development community."[16] With these issues in mind, hospital bed availability was included as an independent variable for

analysis as an analogue to the efforts previously attempted in Afghanistan, as reflected in the PRT manual's designated tasks described in chapter 2 and current Army doctrine described in chapter 3.

Finally, the application of resources towards improving population access to improved water and sanitation sources facilitates bigger goals in regards to the U5MR, but also plays into the strengths of the Army by clarifying a desired end state with an objective measure. Thus, the percentage of the population with access to improved drinking water sources and sanitation sources was included for study as independent variables. In 2010, diarrhea caused nearly 25 percent of the childhood deaths in Afghanistan.[17] Chronic intermittent diarrhea, originating from a lack of appropriate water sources and deficits in hygiene, is also the leading contributor to malnourishment in children, which in turn is a contributor to over one-half of all childhood deaths.[18] Given the important health implications of clean water, it is also important to emphasize that efforts necessary to ensure safe water, along with appropriate sanitation, require the assistance of other assets across the DoD. For example, the United States Army Corps of Engineers (USACE), whose mission statement includes the delivery of "vital public and military engineering services," serves as the lead agent for such projects in the deployed setting.[19]

Using these aforementioned factors, the consolidation of data for both dependent and independent variables is shown in table 4 (for complete source data information, please see Appendix D).

Table 4. Data for Analysis

States with / without Insurgency 2008[a]		Elements of Healthcare Production				Potential Aid Interventions					
		Labor Force Participation Rate[1] (Higher=Better)	GNI Per Capita[2] (Higher=Better)	Arable Land (Hectares per person)[3] (Higher=Better)	Physician Density (per 1000 Population)[4] (Higher=Better)	Under 5 Mortality Rate[5] (Lower=Better)	Measels Vaccine Coverage Rate (% Children 12-23 Months)[6] (Higher=Better)	Child Malnutrition (% under 5 Underweight)[7] (Lower=Better)	Improved Drinking water Sources (% of Population with Access)[8] (Higher=Better)	Improved Sanitation Sources (% of Population with Access)[9] (Higher=Better)	Hospital Beds (per 1000 Population)[10] (Higher=Better)
Insurgency	Afghanistan	49	510	0.77	0.2	194	62	32.9	57	28	0.4
Insurgency	Columbia	70	5460	0.04	1.5	19	88	3.4	91	79	1.4
Insurgency	India	58	1290	0.13	0.6	61	74	43.5	91	34	0.7
Insurgency	Iraq	44	4480	0.13	0.6	36	74	7.1	84	83	1.3
Insurgency	Ivory coast	68	1220	0.15	0.1	114	70	29.4	80	21	0.4
Insurgency	Nigeria	56	1460	0.23	0.4	124	56	24.4	63	29	0.5
Insurgency	Pakistan	56	1060	0.12	0.8	90	82	30.9	91	47	0.6
Insurgency	Palestine (West Bank)	42	1340	0.01	1.3	27	99	4.0	82	94	1.3
Insurgency	Phillippines	66	2060	0.06	1.2	32	80	20.2	92	74	1.0
Insurgency	Somalia	58	110	0.11	0.0	156	46	32.8	31	23	0.0
Insurgency	Sri Lanka	59	2260	0.06	0.7	10	99	21.1	94	90	3.6
Insurgency	Sudan	54	950	0.41	0.3	78	90	27.0	55	22	0.8
Insurgency	Thailand	78	4320	0.24	0.4	14	98	7.0	96	93	2.1
Insurgency	Uganda	78	470	0.20	0.1	78	73	14.1	72	33	0.5
Control-Low	Bangladesh	73	690	0.05	0.3	47	94	36.8	83	55	0.6
Control-Low	Cambodia	85	740	0.28	0.2	44	93	29.0	66	33	0.8
Control-Low	Chad	72	920	0.38	0.0	199	46	33.9	50	12	0.4
Control-Low	Eritrea	86	310	0.12	0.0	56	99	34.5	60	13	0.7
Control-Low	Ethiopia	86	340	0.16	0.0	76	66	29.2	48	21	6.3
Control-Low	Haiti	67	650	0.10	0.3	175	58	11.6	62	24	1.3
Control-Low	Kenya	67	800	0.13	0.2	79	86	16.4	60	29	1.4
Control-Low	Kyrgyzistan	70	840	0.23	2.3	31	99	4.7	88	92	4.8
Control-Low	Madagascar	90	420	0.17	0.2	63	73	36.8	48	13	0.2
Control-Low	Myanmar	82	811	0.21	0.5	56	88	22.6	83	75	0.6
Control-Low	Rwanda	88	510	0.11	0.1	64	95	11.7	70	61	1.6
Control-Low	Sierra Leone	69	450	0.19	0.0	193	80	18.6	58	13	0.4
Control-Low	Tajikistan	70	720	0.11	2.1	63	94	8.3	70	94	5.2
Control-Low	Zimbabwe	87	470	0.31	0.1	97	90	10.1	80	40	1.7
Control-Medium	Cameroon	71	1130	0.30	0.1	108	79	15.1	72	45	1.3
Control-Medium	Djibouti	54	1030	0.00	0.2	86	85	29.8	92	61	1.4
Control-Medium	El Salvador	65	3350	0.11	1.6	17	92	6.6	90	70	1.0
Control-Medium	Georgia	68	2680	0.09	4.8	22	94	1.1	97	94	3.1
Control-Medium	Indonesia	70	2500	0.10	0.3	34	75	18.6	84	57	0.6
Control-Medium	Jordan	44	4140	0.03	2.6	20	98	3.0	96	98	1.8
Control-Medium	Mexico	64	8700	0.21	2.0	17	95	2.8	94	84	1.7
Control-Medium	Nicaragua	65	1430	0.33	0.4	26	99	5.7	85	52	0.8
Control-Medium	South Africa	55	5990	0.25	0.8	53	74	8.7	94	73	2.8
Control-Medium	Tunisia	51	4150	0.27	1.2	18	97	3.3	96	89	2.1
Control-Medium	Turkey	52	9980	0.30	1.5	16	97	3.5	100	91	2.5
Control-Medium	Ukraine	67	2990	0.71	3.2	12	56	0.9	98	94	8.7
Control-Medium	Venezuela	68	11520	0.09	1.9	16	79	2.9	93	91	1.1
Control-Medium	Yemen	50	1220	0.06	0.2	64	73	43.1	92	53	1.8
Control-High	Australia	77	46380	1.93	3.9	5	94	0.2	100	100	3.9
Control-High	Bahrain	72	18810	0.00	1.5	10	99	7.6	100	99	1.8
Control-High	Barbados	81	15710	0.04	1.8	19	85	5.3	100	92	6.6
Control-High	Canada	78	43400	1.28	2.1	6	97	1.8	100	100	2.7
Control-High	Chile	66	10720	0.07	1.0	9	93	0.5	98	98	2.0
Control-High	Croatia	64	13550	0.20	2.7	5	96	0.5	99	98	5.6
Control-High	Czech Republic	70	18450	0.30	3.7	4	98	2.1	100	100	7.0
Control-High	Equitorial Guinea	88	9840	0.19	0.3	107	51	10.6	51	89	2.1
Control-High	Japan	74	42190	0.03	2.3	3	94	3.0	100	100	13.7
Control-High	Oman	62	19820	0.01	2.0	12	99	8.6	93	97	0.7
Control-High	Saudi Arabia	53	19360	0.10	0.9	10	98	5.3	97	100	2.2
Control-High	Singapore	73	43980	0.00	1.9	3	95	3.3	100	100	2.0
Control-High	United States	73	48960	0.52	2.4	7	92	1.3	99	100	3.0
Control-High	Uraguay	76	10110	0.50	3.7	9	94	4.5	99	96	1.2

Source: Created by author.

[1] David C. Gompert et al., *War by Other Means: Building Complete and Balanced Capabilities for Counterinsurgency* (Arlington, VA: Rand National Defense Research Institute, 2008), 373-376.

[2] Ibid.

[3] Ibid., 376.

[4] Eamonn Butler, *The Condensed Wealth of Nations* (England: Adam Smith Research Trust, 2011), 16, accessed June 2, 2014, http://www.adamsmith.org/sites/default/files/resources/condensed-WoN.pdf.

[5] Frank H.Knight, *Risk, Uncertainty, and Profit* (Boston, MA: Houghton Mifflin Publishing, 1921), accessed June 2, 2014, http://www.econlib.org/library/Knight/knRUP8.html.

[6] World Bank, "Labor Force Participation Rate, Total," accessed September 7, 2014, http://data.worldbank.org/indicator/SL.TLF.CACT.ZS/countries/1W?display=graph; World Bank, "GNI Per Capita, Atlas Method (Current US $)," accessed September 7, 2014, http://data.worldbank.org/indicator/NY.GNP.PCAP.CD?display=map; World Bank, "Arable Land (Hectares)," accessed September 7, 2014, http://data.worldbank.org/indicator/AG.LND.ARBL.HA; World Bank, "Physicians (per 1,000 People), accessed September 7, 2014, http://data.worldbank.org/indicator/SH.MED.PHYS.ZS.

[7] Alwan, "Demographic, Social and Health Indicators for Countries of the Eastern Mediterranean," 3.

[8] Institute for Health Metrics and Evaluation (IHME), *The Global Burden of Disease: Generating Evidence, Guiding Policy*, 16.

[9] United Nations Statistics Division, "Millennium Development Goals Indicators," accessed March 4, 2014, http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=561.

[10] UNICEF, WHO, The World Bank, and UN Population Division, *Levels and Trends of Child Mortality in 2006: Estimates developed by the Inter-agency Group for Child Mortality Estimation* (New York, NY: UNICEF, December 2007), 34, accessed March 20, 2014, http://www.childinfo.org/files/infant_child_mortality_2006.pdf.

[11] Ibid.

[12] Gareth Jones et al., "How Many Child Deaths Can We Prevent This Year?" *Lancet* 362, no. 9377 (July 2003): 69, accessed February 15, 2014, http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(03)13811-1/fulltext.

[13] Food and Agriculture Organization of the United Nations, *The Fate of Food Insecurity in the World 2013* (Rome: Food and Agriculture Organization of the United Nations, 2013), 17, accessed August 11, 2014, http://www.fao.org/docrep/018/i3434e/i3434e.pdf.

[14] Tarpy, "The Role of the U.S. Army in Health System Reconstruction and Development During Counterinsurgency," 36.

[15] Joint Chiefs of Staff, Joint Publication (JP) 3-08, *Interorganizational Coordination During Joint Operations* (Washington, DC: Government Printing Office, June 2011), I-17.

[16] Ibid.

[17] William Newbrander, "Preventing Diarrhea that Kills Children in Rural Afghanistan," last modified December 14, 2010, accessed March 9, 2014, http://www.msh.org/blog/2010/12/14/preventing-diarrhea-that-kills-children-in-rural-afghanistan.

[18] Ibid.

[19] United States Corps of Engineers, "USACE Mission and Vision," accessed March 10, 2014, http://www.usace.army.mil/About/MissionandVision.aspx.

CHAPTER 4

ANALYSIS TO DETERMINE OPTIMAL HEALTH SECTOR INTERVENTIONS DURING COUNTERINSURGENCY OPERATIONS

To reiterate, the primary research question is: using the Afghanistan experience as a model, what interventions by the United States Army are optimal in the development of host-nation health systems during counterinsurgency operations? Likewise, the secondary research questions include:

1. How has the health of Afghans changed as a result of ISAF interventions?
2. What are the established methods for health sector improvement in the developing world?
3. Why are the essential needs, particularly the medical needs, of the populace important in a counterinsurgency operation?
4. What is the Army doctrinal foundation for intervening in health sector development?
5. Which health sector interventions provide the greatest impact while also facilitating strategic counterinsurgency goals?

Chapter 2 addressed the current status of Afghan health following ISAF intervention, which found that despite over $92 billion in humanitarian assistance, many countries with a comparable GDP per capita have had similar improvements (some dramatically more so) despite the lack of similar financial resources. In addition, chapter 2 further answered the issues raised by questions 2 and 3, where application of the Disability Adjusted Life Year (DALY) can provide insight of the burden placed on a society by disease and thus, can serve to target the health challenges that affect wide

segments of society, such as the mother-child unit. This in turn supports a broader COIN strategy, by engaging broad sections of the population to foster host-nation government legitimacy and subsequently deteriorate an insurgent powerbase. In answering question 4, the importance of Measures of Effectiveness (MOEs) in conducting COIN became apparent, and provides a framework within which the Army can apply interventions to mitigate high DALY producing diseases within the population. Finally, question 5 assisted in the formulation of the potential aid intervention independent variables used for analysis in chapter 3, namely the U5MR, measles vaccine rate, child malnutrition, access to improved drinking and sanitation sources, and the hospital bed prevalence. This chapter will discuss the results of the ANOVA study with Tukey analysis and highlight the areas of statistical significance noted between the data reflected in the dependent and independent variables. The results of this process will answer question 5, which will then lead to the assertion of recommendations addressing the primary research question in chapter 5.

Statistical Results

Analysis of Variance (ANOVA) assesses the means of multiple groups for statistical significance. In this application of ANOVA, the null hypothesis is that the independent variables (economic factors and health-sector metrics) have no statistical significance with the dependent variables (countries with and without insurgency present). If the probability (reflected in the p-value) of the results showed a >95 percent confidence interval (equivalent to a p-value of <0.05), then the null hypothesis was rejected and a statistical significance was deemed to exist. While the ANOVA results can determine whether the statistical significance exists in general, it cannot determine which

groups among the sample (i.e. the dependent variable sets) are significantly better when compared to each other. In order to address this issue, the application of the Tukey Method clarified the statistical significance noted from ANOVA.

Table 5 notes the samples where statistical significance was found that permitted the null hypothesis to be rejected. Of note, two independent variables had p-values that fell outside of a 95 percent confidence interval and the null hypothesis could not be rejected. Essentially, random chance could explain the ANOVA results between the arable land and the measles vaccine coverage rate independent variables to the dependent variables.

Table 5. ANOVA Results

		Elements of Healthcare Production				Potential Aid Interventions					
		Labor Force Participation Rate	GNI Per Capita	Arable Land (Hectares per person)	Physician Density (per 1000 Population)	Under 5 Mortality Rate	Measels Vaccine Coverage Rate (% Children 12-23 Months)	Child Malnutrition (% under 5 Underweight)	Improved Drinking-water Sources (% of Population with Access)	Improved Sanitation Sources (% of Population with Access)	Hospital Beds (per 1000 Population)
	P-value	P=0.000	P=0.000	P=0.252	P=0.000	P=0.000	P=0.101	P=0.000	P=0.000	P=0.000	P=0.014
Insurgency and Income	Insurgency	Statistical Significance	Statistical Significance	No Statistical Significance	Statistical Significance	Statistical Significance	No Statistical Significance	Statistical Significance	Statistical Significance	Statistical Significance	Statistical Significance
	Control-Low										
	Control Medium										
	Control-High										

Source: Created by author.

The lack of statistical significance in regard to the arable land independent variable is not surprising. Given the current global economy, a nation's ability to trade assets in exchange for food may imply that arable land is not as critical a resource as it was during Adam Smith's lifetime thanks to potential comparative advantages a country may possess. Likewise, casual observation of the source data reveals that Afghanistan, Cambodia, Tunisia, and the Czech Republic all have essentially identical arable land

capacity (0.27 to 0.30 hectares per person) despite each being from separate dependent variable categories, thus supporting the acceptance of a random data distribution.

The findings in regards to the measles vaccine coverage rate are more surprising. Given the presumed importance of the U5MR, the selection of the measles vaccine coverage rate occurred because the measles vaccine is often the last immunization given to children in the developing world (at 12 to 23 months). Therefore, the assumption is that if a child receives this vaccination, then they likely received the preceding immunizations as well. Given that the P-value of the measles vaccine coverage rate fell outside of a 95 percent confidence interval, then the null hypothesis must be accepted. This is likely reflective of the more egalitarian distribution of vaccines seen worldwide over the past 30 years. More specifically, Millennium Developmental Goal 4, "Reduce Child Mortality," uses immunization indicators to monitor progress.[1] Likewise, researchers in Latin America and the Caribbean found that "more than half of the gains in reducing child mortality are attributable to immunization" and in regards to measles vaccination, deaths have plummeted from an estimated 46,000 in 1990 to zero in 2004.[2] The measles vaccination data also passes a "common sense test" where casual observation reveals Sudan, Zimbabwe, El Salvador, and the United States all having similar vaccination rates (90 to 92 percent), again supporting the notion of a random data distribution amongst dependent variables. Therefore, the lack of statistical significance in this study may actually reflect the dramatic success in public health immunization initiatives worldwide.

Discussion of Statistical Significance

The application of the Tukey Method allowed the examination of which group of dependent variables (insurgency, low-, middle-, or high-income countries) had the most statistical significance. Essentially, the Tukey Method seeks to describe where the confidence intervals fall relative to the mean differences of the dependent variables. This process allows a determination of which (if any) dependent variable set is significantly better than another. Better, in this sense, refers to an ordinal ranking (i.e. 1 (or first) is better than 2 (or second)). In an effort to answer the primary research question, the Tukey analysis results were examined from the perspective of the insurgent countries, and in particular, how the insurgent countries related to the income-distribution based countries. In an effort to display these similarities graphically, a series of diagrams to illustrate the relationship between the dependent samples for each independent variable are presented in figure 2.

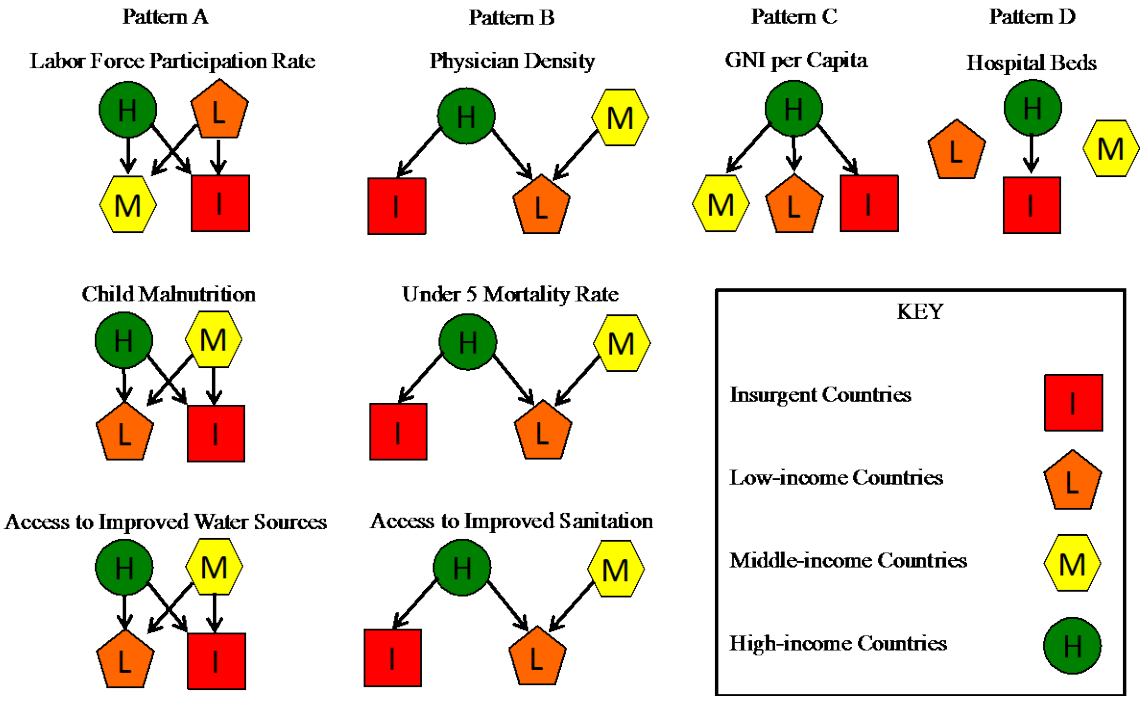

Figure 2. Tukey Test Findings

Source: Created by author.

In the above diagrams, I, H, M, and L represent insurgency, high-, middle-, and low-income countries respectively. In an effort to accurately display the ordinal ranking produced by the Tukey test, arrows represent a dependent variable country set being better (i.e. a greater statistical significance) than another dependent country set. A lack of arrows between dependent country groups means that there is not enough data to determine the ordinal relationship. Interestingly, the Tukey Test results generated two general findings. The first is that high-income countries were always better than at least one competing dependent variable country set. Also, insurgency was never better than any other competing dependent variable country set.

The data results from the Tukey Method produced four unique patterns. In the first pattern (Pattern A), the labor force participation rate, child malnutrition, and access to improved water sources all shared similar results to the dependent variables of insurgency and low- and middle-income countries respectively. The findings of the labor force participation rate showed that both high- and low-income countries were better than insurgency and middle-income countries. This could be explained by the rationale that in low-income countries people must work in order to provide the basic means of subsistence and supplemental monetary support from government services is often lacking (thus a median labor force participation rate of 77.5). Meanwhile, in high-income countries the people are capable of earning a stable living with a host of opportunities for employment (reflective of a median labor force participation rate of 73). On the other hand, the data for insurgent and middle-income countries (with median labor force participation rate values of 58 and 64.5 respectively) reflect under-employed citizens who, in turn, may provide a source of instability.

This data appears at odds recent findings by Eli Berman, et al., that unemployment correlates with less violence in countries where an insurgency is present.[3] While the conclusions reached by Berman may be correct, this data may be more accurate in determining which conditions are more prone for insurgency to take hold. For example, using World Bank classification, of the 14 insurgent countries examined, only three fall in the low-income category (Afghanistan, Uganda, and Somalia), while the remainder fall in the middle-income brackets, thus supporting the results of the Tukey analysis.[4] So, while unemployment may correlate well with levels of violence in an insurgency once the conflict starts, it may not be the best indicator of where an

insurgency may take hold, which may be of interest in determining where to focus Phase Zero shaping operations in an effort to curb potential future violence.

Similar to the labor force participation rate, the child malnutrition and access to improved water sources data showed that high- and medium-income countries were both better than low-income and insurgency countries. Support for this finding appears through examination of the duration of insurgent fighting. In the 14 countries in the insurgency sample set, the median year fighting began is 1991. Therefore, using 2010 data for these health metrics reflects nearly two decades of conflict, which could mirror an opportunity cost that fighting imposed on the population like that seen in the poorest countries on earth.

The physician density, U5MR, and access to improved sanitation data all showed the same pattern (Pattern B) of statistical significance where high-income countries were better than insurgency and low-income countries while medium-income countries were better than low-income countries. As previously mentioned, all of the Tukey Test results showed that high-income nations were always better than insurgencies. Casual observation supports this notion, as rich nations tend to also be the most stable. Likewise, previous acknowledgement established that the insurgency countries are also those who lay in the low- and middle-income nations of the World Bank classification. However, these results are interesting in that, in every circumstance, insurgency is never better than low- or medium-income countries. As previously stated, this could imply that insurgency imposes an opportunity cost on a country that subjects it to worse overall outcomes in regard to health metrics.

The GNI per capita data results (Pattern C) are not surprising. In this analysis of dependent variables against the independent factor of gross national income, statistical significance occurred with high-income countries being better than insurgency, medium- and low-income countries. As mentioned above, three of the insurgency countries fall in the low-income category (Afghanistan, Uganda, and Somalia), while the remainder lie in the middle-income bracket.[5] Therefore, when comparing the dependent variables against an independent variable that was also used to essentially define the organization of the dependent variables (with the obvious exception of the insurgency countries), it is not surprising that the witnessed findings occur. What is noteworthy, however, is to observe that we do not see medium income nations (or insurgency) being better than low-income nations. This probably reflects the income disparity between the high-income nations and the rest of the world. Specifically, the median GNI per capita values for insurgency, low-, middle-, and high-income countries were $1315, $670, $3170, and $19,085 respectively.

The final unique pattern that emerged following Tukey analysis involved the comparison of hospital beds per 1000 people against the dependent variables (Pattern D). In this analysis, a result similar to the GNI per capita results emerged, except that high-income countries were better than insurgency and there is not sufficient information to make any assertions regarding low- or middle-income countries. Therefore, an assumption may be that the conditions present in insurgency countries are the only situation where this independent variable is demonstrably worse than when compared to any other dependent variable set. Similarly, the median hospital bed rate in insurgency countries (0.8) is the worst of the remaining dependent variable groups (1.05, 1.8, and 2.5 for low-, middle-, and high-income countries respectively), which could imply that

although similar to peer economic nations that are not facing internal conflict, an opportunity cost from insurgency may still be acting to drag this statistic.

In summary, a consolidation of the results of the ANOVA and subsequent Tukey analysis are shown below:

Table 6. Final Results

Independent Variable	Statistical Significance
Labor Force Participation Rate[1] P=0.000	Present. High- and low-income countries are better than insurgency countries.
GNI Per Capita[2] P=0.000	Present. High-income countries are better than insurgency countries.
Arable Land (Hectares per person)[3] P=0.252	None
Physician Density (per 1000 Popualtion)[4] P=0.000	Present. High-income countries are better than insurgency countries.
Under 5 Mortality Rate[5] P=0.000	Present. High-income countries are better than insurgency countries.
Measels Vaccine Coverage Rate (% Children 12-23 Months)[6] P=0.101	None.
Child Malnutrition (% under 5 Underweight)[7] P=0.000	Present. High- and medium-income countries are better than insurgency countries.
Improved Drinking-water Sources (% of Population with Access)[8] P=0.000	Present. High- and medium-income countries are better than insurgency countries.
Improved Sanitation Sources (% of Population with Access)[9] P=0.000	Present. High-income countries are better than insurgency countries.
Hospital Beds (per 1000 Population)[10] P=0.014	Present. High-income countries are better than insurgency countries.

Source: Created by author.

[1] United Nations Millennium Development Goals and Beyond 2015, "Target 4.A: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate," last modified January 29, 2013, accessed July 27, 2014, http://www.un.org/millenniumgoals/childhealth.shtml.

[2] Jon Kim Andrus, "Immunization and the Millennium Development Goals: Progress and Challenges in Latin America and the Caribbean," *Health Affairs* 27, no. 2 (March 2008): 487, accessed July 27, 2014, http://content.healthaffairs.org/content/27/2/487.full.pdf+html.

[3] Eli Berman et al., "Do Working Men Rebel? Insurgency and Unemployment in Afghanistan, Iraq, and the Philippines," *Journal of Conflict Resolution* 55 (March 2011): 516, accessed July 28, 2014, http://cega.berkeley.edu/assets/cega_research_projects/50/Do_Working_Men_Rebel_.pdf.

[4] World Bank, “Country Lending Groups,” accessed July 28, 2014, http://data.worldbank.org/about/country-and-lending-groups#Lower_middle_income.

[5] Ibid.

CHAPTER 5

CONCLUSIONS

The purpose of this research is to contribute to the knowledge of counterinsurgency warfare specifically in terms of the role that the Army should provide in facilitating Primary Health Care (PHC) through reconstruction and intervention. This work also assumes that the United States Army will continue its involvement with counterinsurgency operations into the future and that the experiences of Afghanistan will be relevant to these operations. It is important to emphasize that, as noted in chapter 2, donors spent over $90 billion on Afghanistan development without a direct correlation to improvement in health sector metrics when compared to peer nations. The conclusions reached in chapter 5, which consolidate the answers from the primary and secondary research questions, should influence how the Army pursues its medical development efforts in a COIN environment into the future.

Interpretation of Results

The ANOVA discovered strong statistical significance (P=0.000) in regard to the labor force participation rate, GNI per capita, physician density, U5MR, childhood malnutrition, and the access to improved drinking water and sanitation resources. Additionally, a statistical significance (p=0.014) was also observed with hospital beds (per 1000 population). Furthermore, application of the Tukey Method showed that high-income countries were always better than insurgency countries while insurgency countries were never better than any other competing dependent variable country set.

Economically, the insurgency countries included three members of the low-income ranking (Afghanistan, Uganda, and Somalia) with the remaining nine insurgent members falling in the middle-income bracket. Despite being, as a whole, economically superior to the low-income nations, the insurgent countries were never better than the low-income nations, and low-income nations were better than insurgent countries in regards to the labor-force participation rate. Additionally, medium-income countries were better than insurgent countries in both childhood malnutrition and access to improved water sources.

What interventions by the United States Army are optimal in the development of host-nation health systems during counterinsurgency operations? Overall, the implication of these findings is that in attempting to address the PHC needs of a country facing an insurgency, a counterinsurgency strategy must:

1. Not impose expectations similar to high-income countries, as these countries are better than insurgent countries in every category that achieved statistical significance. For example, American standards of healthcare, broadly speaking, are probably inappropriate for Afghanistan as the disparities evident from the Tukey Analysis are unlikely to be overcome by the Army while seeking to win a COIN struggle. Such goals should not necessarily be abandoned, but rather relegated to agencies whose expertise can better fulfill decades-long improvement efforts once the security situation permits.
2. Expect that the conflict occurring in insurgent countries exacts an opportunity cost, which serves to exacerbate conditions more than a simple economic classification (i.e. low- or middle-income nation) would suggest. As previously

noted, this is because the collection of insurgent countries were economically superior to the low-income nations (based on the GNI per capita) but failed to demonstrate ever being better than the low-income nations in regards to any healthcare-related independent variable examined through Tukey Analysis.

3. Consider special attention to childhood malnutrition and access to improved water sources as these independent variables both showed impressive degrees of statistical significance (P=0.000) with Tukey results in which middle-income countries were demonstrably better than insurgency countries. These areas may represent unique conditions where the opportunity cost of insurgency fighting is the most severe on the population (particularly given that nine out of the twelve insurgency countries were also middle-income nations per the World Bank classification). Additionally, these variables may serve as good examples of potential MOEs in a counterinsurgency operation. Specifically, these variables directly affect a wide population segment, namely the mother-child unit, and potentially reflect a variety of high DALY producing conditions.

Recommendations

If one assumes that the principles of war belie a fundamental truth, then efforts to facilitate objective, unity of command, and simplicity will provide a valuable resource to gain a relative position of advantage over a future adversary. As such, in order to restore essential services, including PHC, within a broader COIN strategy it is necessary to provide clarity of purpose as to what these efforts will need, how they will be applied, and what can be gained from their application. Therefore an appropriate end state for PHC assistance in COIN may be:

> Improved population health through focused efforts collaborated by appropriate MOEs and coordinated with an overall counterinsurgency strategy, which transitions to sustainable programs for both host nation governments and other unified action partners.

How can such an end state be achieved? Based on experiences in Afghanistan, it is logical to conclude that a capability gap exists in regards to the Army's ability to effectively restore PHC as an essential government service in the COIN environment. Specifically, this capability gap implies a unique warfighting challenge that is currently not appropriately manned, trained, or equipped by the Army. When facing a capability gap, recommendations to alleviate the shortfall may lie within doctrine, organization, training, material, leadership, personnel, and (or) facilities (DOTMLPF). In regards to the specific capability gap identified in this work, the proposed recommendations include doctrinal, organizational, and training modifications.

As noted in chapter 2, although explicitly tasked with providing medical stability operations at the brigade, division, and corps level, there is an absence of doctrine to provide guidance in the execution of such operations, particularly in regards to COIN. This is the crucial area where a headquarters can outline guidance for potential Measures of Effectiveness (MOEs). As previously stated, MOEs determine if an organization is doing the right things to meet the goals along an organization's line of effort. MOEs are critical as they define success and in turn, victory. Without clear MOEs, supported by established doctrine, and directed at the facts as they exist in the operational environment (perhaps focusing on areas of child malnutrition and access to improved water sources as the statistical results suggest and as they relate to high DALY-producing diseases in the area of operations), then the United States Army will be likely duplicate the same marginal results achieved in Afghanistan in any future COIN endeavor.

Organizationally, the United States Army Medical Command does not have an institute, center, or agency tasked with supervising training or providing direct guidance in facilitating PHC during COIN operations. Given that the brigade and higher echelon elements of the Army serve as the landowners in a combat environment, it is recommended that the responsibility for medical stability operations remain at this level, as dictated by the current Army Universal Task List. However, given the wide area security mission inherent to the United States Army, there should be a lead agent responsibility at MEDCOM, presumably located at the AMEDD Center and School or perhaps within Public Health Command, who can refine doctrine and distribute best practices regarding the delivery of PHC across a range of operational environments, including COIN. This also supports the current doctrinal expectation that an Army corps headquarters will likely assume Joint Task Force (JTF) responsibilities in a future COIN operation, and as previously mentioned in JP 3-57, the Joint Force Surgeon will therefore have the responsibility for health support activities to include medical stability operations and humanitarian assistance.[1]

Training is perhaps the most critical piece of addressing this capability shortfall. Currently, the Center for Disaster and Humanitarian Assistance Medicine (CDHAM) provides support to the DoD through consultation and training in regards to the broad delivery of healthcare diplomacy.[2] To meet this mission, CDHAM, in conjunction with the Defense Medical Readiness Training Institute (DMRTI) offers several training opportunities to include the Military Medical Humanitarian Assistance Course (MMHAC) and the Global Health Strategies for Security Course (GHSSC). Furthermore, the DMRTI offers a Medical Stability Operations Course (MSOC) dedicated to fulfilling

the standards established by DoD Instruction 6000.16 (as noted in chapter 2). However, due to recent budgetary constraints, all of these courses are currently offered only once a year, do not produce an Additional Skill Identifier (ASI), and are not required in order to serve at any level of medical support where liaison with a battle space-owning commander is required (Battalion through Combatant Command).

Similarly, the Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DMHA) serves as the coordinating authority for civil-military operations in disaster management and humanitarian assistance in the Pacific Command (PACOM) area of responsibility.[3] Established in 1994 by congressional legislation, CFE-DMHA "addresses the worldwide need for education, training, and interagency and international civil-military cooperation and coordination to provide relief, stability, and security."[4] While CFE-DMHA provides training opportunities through the Humanitarian Assistance Response Training (HART) and Health Emergencies in Large Populations (HELP) courses, these also do not produce an ASI, nor focus on the operations in the COIN environment. Furthermore, all of these opportunities fall short of the established civilian standards for either the International Diploma in Humanitarian Assistance (over 200 hours of education) or the Diploma in the Medical Care of Catastrophes.[5]

Ultimately, in order to best prepare for the next COIN battlefield, the United States Army should:

1. Establish an organization within MEDCOM as the DoD lead for COIN-related PHC development efforts via medical stability operations that is responsible for doctrine production, training, and dissemination of best practices.

2. Adjust current training opportunities to include the conduct of medical stability operations in the COIN environment through the facilitation of host-nation PHC development and establish an ASI for individuals who successfully meet the training standards of these programs.
3. Ensure that key positions within the brigade and higher echelon surgeon cells are coded for these ASI positions and that all individuals prior to deployment complete this required training.
4. Educate future commanders on how to approach medical stability operations within the broader context of COIN through formal instruction at the Command and General Staff Officer's Course (CGSOC) and the Senior Service Colleges (SSC).

What are the benefits of embracing such recommendations? If the United States Army had a coherent and consistent approach to facilitating PHC in a COIN environment, which targeted the most pressing medical needs of a population through clear objectives (again, perhaps in the areas of child malnutrition and access to improved water sources), then there may be a corresponding increase in the legitimacy of a host-nation government. Such a reaction would both further public health goals and establish expectations amongst those responsible for public health in the host government as well as in supporting IGOs and NGOs. The publication of Army MOE methodology will focus the efforts of limited resources and allow unified action partners to concentrate on the health problems that will require years, if not decades, of assistance thus providing a unity of effort where one currently does not exist.

Areas for Further Study and Conclusions

The recent COIN experiences faced by the United States Army in both Iraq and Afghanistan proved to be tough, challenging fights that culminated in an etiolated end, bereft of obvious victory and plagued by doubt from the American populace. As Afghanistan begins the final phase of drawdown in operational forces, many in the Army see the return to emphasizing high-intensity ground combat while dismissing COIN as a fool's errand that must not be repeated. However, such an assertion seeks to minimize the enemy's influence on the battlefield by concluding that American dominance in intelligence and firepower to facilitate accurate targeting negates any further significant refinement in doctrine or strategy. Assuming that the United States will continue to hold dominance in sheer combat power for the foreseeable future, enemies will likely continue to embrace the fourth generation warfare techniques applied over the past decade, and in all probability, continue to refine the hybrid threat model. This acknowledgement of enemy intentions accepts the Clausewitzian nature of war as a duel between two opponents, and forces the United States Army to remain proficient in the full spectrum of conflict, despite out best attempts to avoid similar COIN struggles in the future.

This work illustrates an approach to facilitate PHC as one aspect of restoring essential government services as a means to establish host-nation government legitimacy in order to deny the population base critical to an insurgency's success. Currently, the Army is planning to modify its operational tempo post-Iraq and Afghanistan with the development of Regionally Aligned Forces (RAF), who will provide a ready pool of available forces for Combatant Commands (COCOMs). It is reasonable to expect that COCOMs will employ this ready force pool in a number of Phase Zero operations that

will seek to shape the environment in order to promote stability and ultimately deter war. One must then ask the question, should COCOMs pursue medical stability operations as a method to effectively address Phase Zero requirements and how should COCOMs conduct such operations? Hopefully, this work provides a framework for the application of Army resources to such a situation, and potentially to medical stability tasks spanning the continuum of military operations that include missions outside of COIN. However, such an assertion requires further study to validate the optimal approach in facilitating PHC capability in mission sets separate from COIN. Ultimately, the solutions sought in this work may be as elusive as the unified theory of physics; regardless, the struggles of Afghanistan endured by American fighting men and women demand introspection during peacetime so as to best prepare for the next crucible of combat.

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[1] Joint Chiefs of Staff, JP 3-57, *Civil-Military Operations*, II-10.

[2] Charles W. Beadling, "Director's Statement: Center for Disaster and Humanitarian Assistance Medicine," accessed September 1, 2014, http://www.cdham.org/directors-statement.

[3] Center for Excellence in Disaster Management and Humanitarian Assistance, "About CFE-DMHA," accessed September 29, 2014, http://www.coe-dmha.org/about-cfe-dmha/index.html.

[4] Center for Excellence in Disaster Management and Humanitarian Assistance, "Hierarchy of Strategies, Plans, and doctrine for Disaster Management and Humanitarian Assistance," accessed September 29, 2014, http://www.coe-dmha.org/about-cfe-dmha/hierarchy-strategies-plans-doctrine-dmha.html.

[5] Center for International Humanitarian Cooperation, "IDHA: International Diploma in Humanitarian Assistance," accessed September 1, 2014, http://www.cihc.org/idha; Worshipful Society of Apothecaries of London, "Diploma in the Medical Care of Catastrophes," accessed September 1, 2014, http://www.apothecaries.org/examination/diploma-in-the-medical-care-of-catastrophes/.

APPENDIX A

AFGHAN HEALTH DATA

	AFGHANISTAN													
	Year													
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Population Metric														
Population (Total)[1]	19987071	20595360	21347782	22202806	23116142	24018682	24860855	25631282	26349243	27032197	27708187	28397812	29105480	29824536
Population growth (Annual %)[2]	2.5	3	3.6	3.9	4	3.8	3.4	3.1	2.8	2.6	2.5	2.5	2.5	2.4
Population ages 65 and Above (%)[3]	7	7	7	7	8	8	9	9	9	10	2	2	2	2
Population 0 to 14 (%)[4]	49	49	50	50	49	49	49	49	49	49	49	49	48	47
Economic Metric														
GDP per capita (Current US $)[5]	NA	NA	115	186	198	220	252	275	374	377	451	561	614	687
Health expenditure, Public (% of government expenditure)[6]	NA	NA	NA	6.7	1.4	1.9	1.1	1.5	1.4	2.6	3	3.5	3.5	7.1
Health Metric														
Access to improved drinking water (%)[7]	NA	22	NA	NA	NA	NA	40	NA	NA	NA	NA	57	NA	64
Access to improved sanitation (%)[8]	NA	23	NA	NA	NA	NA	26	NA	NA	NA	NA	28	NA	29
Maternal mortality ratio (modeled estimate per 100,000 live births)[9]	NA	1100	NA	NA	NA	NA	730	NA	NA	NA	NA	500	NA	400
Infant mortality rate (per 1000 live births)[10]	95	94	92	90	88	85	83	81	79	78	76	74	73	71
Under 5 mortality rate (per 1000 live births)[11]	137	134	131	128	124	121	118	115	112	109	106	104	101	99
Malnutrition prevalence, weight for age (% of children under 5)[12]	NA	NA	NA	NA	NA	33	NA	NA	NA	NA	NA	NA	NA	NA
One year-old immunized with BCG (%)[13]	38	30	43	46	44	51	57	60	60	66	64	68	71	75
One year-old immunized with DPT3 (%)[14]	27	24	33	36	41	50	58	58	63	64	63	66	68	71
One year-old immunized with HBV3 (%)[15]	0	0	0	0	0	0	0	0	63	64	63	66	68	71
One year-old immunized with measles vaccine (%)[16]	31	27	37	35	39	48	50	53	55	59	60	62	65	68
One year-old immunized with OPV3 (%)[17]	27	24	35	36	41	50	58	58	63	64	63	66	68	71

[1] World Bank, "Population (Total)," accessed June 1, 2014, http://data.worldbank.org/indicator/SP.POP.TOTL.

[2] World Bank, "Population growth (Annual %)," accessed June 1, 2014, http://data.worldbank.org/indicator/SP.POP.GROW.

[3] World Bank, "Population ages 65 and above (%)," accessed June 1, 2014, http://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS.

[4] World Bank, "Population 0 to 14 (%)," accessed June 1, 2014, http://data.worldbank.org/indicator/SP.POP.0014.TO.ZS.

[5] World Bank, "GDP per capita (Current US $)," accessed June 1, 2014, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD.

[6] World Bank, "Health expenditure (% of government expenditure)," accessed June 1, 2014, http://data.worldbank.org/indicator/SH.XPD.PUBL.GX.ZS.

[7] World Bank, “Access to improved drinking water (%),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.H2O.SAFE.ZS.

[8] World Bank, “Access to improved sanitation (%),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.STA.ACSN?page=2.

[9] World Bank, “Maternal mortality ratio (modeled estimate per 100,000 live births),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.STA.MMRT.

[10] World Bank, “Infant mortality rate (per 1000 live births),” accessed June 1, 2014, http://data.worldbank.org/indicator/SP.DYN.IMRT.IN.

[11] World Bank, “Under 5 mortality rate (per 1000 live births),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.DYN.MORT.

[12] World Bank, “Malnutrition prevalence, weight for age (% of children under 5),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.STA.MALN. ZS?page=1.

[13] World Health Organization: Global Health Observatory Data Repository, “One year-old immunized with BCG (%),” accessed June 1, 2014, http://apps.who.int/gho/ data/node.main.A830?lang=en.

[14] World Health Organization: Global Health Observatory Data Repository, “One year-old immunized with DPT3 (%),” accessed June 1, 2014, http://apps.who.int/gho/ data/node.main.A827?lang=en.

[15] World Health Organization: Global Health Observatory Data Repository, “One year-old immunized with HBV3 (%),” accessed June 1, 2014, http://apps.who.int/gho/ data/node.main.A828?lang=en.

[16] World Health Organization: Global Health Observatory Data Repository, “One year-old immunized with measles vaccine (%),” accessed June 1, 2014, http://apps.who.int/gho/ data/node.main.A826?lang=en.

[17] World Health Organization: Global Health Observatory Data Repository, “One year-old immunized with OPV3 (%),” accessed June 1, 2014, http://apps.who.int/gho/ data/node.main.A831?lang=en.

APPENDIX B

COUNTRY COMPARISON

Country Comparison

GDP per Capita Ranking	Country	GNI per Capita (Atlas Method)[1]	Population[2]	Access to Improved Water Sources (Percent)[3]	Access to Improved Sanitation (Percent)[4]	Maternal Mortality Ratio (Modeled Est. Per 100,000	Infant Mortality Rate (Per 1000 Live Births)[6]	Under 5 Mortality Rate (Per 1000 Live Births)[7]	Children <5 Underweight (Percent)[8]	Measles Immunization (Percent of Children 12-23 Months)[9]	Life Expectancy at Birth (Years)[10]
204	Rawanda	$510	10836732	70	61	390	44	64	11.7*******	95	62
205	Nepal	$540	26846016	86	34	220	36	46	29.1*******	86	67
206	Uganda	$470	33987213	72	33	410	51	78	14.1*******	73	57
207	South Sudan	$950	9940929	57*	9*	830	71	112	32.5****	62*	53
208	Sierra Leone	$450	5751976	58	13	1200	123	193	18.6	80	45
209	Comoros	$810	683081	95	35	380	61	83	25.0*	72	60
210	Haiti	$650	9896400	62	24	420	73	175	18.9****	58	62
211	Ethiopia	$340	87095281	48	21	500	51	76	29.2*******	66	61
212	Eritrea	$310	5741159	61**	14**	450	40	56	34.5**	99	61
213	Guinea-Bissau	$540	1586624	70	18	600	85	137	16.6******	69	54
214	Mozambique	$430	23967265	48	20	540	71	101	15.6*******	82	49
215	Guinea	$400	10876033	73	18	690	70	110	20.8******	58	55
216	Afghanistan	$510	28397812	57	28	500	74	104	32.9***	62	60
217	Mali	$660	13985961	64	21	600	83	138	27.9****	63	54
218	Togo	$460	6306014	59	11	480	65	101	16.5	68	55
219	Madagascar	$420	21079532	48	13	480	44	63	36.8***	73	63
220	Tokelau*	NA	1411	NA	NA	0	0	0	NA	NA	69
221	Malawi	$310	15013694	81	10	540	53	83	13.8	93	53
222	Niger	$370	15893746	51	9	690	67	127	39.9****	71	57
223	Liberia	$270	3957990	72	17	680	61	83	20.4*****	65	59
224	Central African Republic	$490	4349921	67	34	960	95	138	28****	53	48
225	Burundi	$200	9232753	75	46	820	71	112	29.1*******	92	53
226	Zimbabwe	$470	13076978	80	44	610	59	97	10.1*******	90	54
227	Somalia	$150*	9636173	31	24	930	96	156	32.8****	46	54
228	Dem. Republic of the Congo	$190	62191161	46	23	810	105	155	24.2	74	49

*All information regarding Tokelau: World Health Organization, "Human Resources for Health Country Profiles: Tokelau," 2013, accessed June 1, 2014, http://www.wpro.who.int/hrh/documents/publications/wpr_hrh_county_profiles_tokelau_upload.pdf.

[1] World Bank, "GNI per Capita (Atlas Method)," accessed June 1, 2014, http://data.worldbank.org/indicator/NY.GNP.PCAP.CD. *1990 Data.

[2] World Bank, "Population (Total)," accessed June 1, 2014, http://data.worldbank.org/indicator/SP.POP.TOTL.

[3] World Bank, "Access to improved drinking water (%)," accessed June 1, 2014, http://data.worldbank.org/indicator/SH.H2O.SAFE.ZS. *2012 Data.
**2008 Data from World Health Organization: Regional Office for Africa, "Eritrea: Factsheets of Health Statistics 2010," accessed June 1, 2014, http://www.afro.who.int/en/eritrea/country-health-profile.html.

[4] World Bank, "Access to improved sanitation (%)," accessed June 1, 2014, http://data.worldbank.org/indicator/SH.STA.ACSN?page=2. *2012 Data.
**2008 Data from: World Health Organization: Regional Office for Africa, "Eritrea: Factsheets of Health Statistics 2010," accessed June 1, 2014, http://www.afro.who.int/en/eritrea/country-health-profile.html.

[5] World Bank, “Maternal mortality ratio (modeled estimate per 100,000 live births),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.STA.MMRT.

[6] World Bank, “Infant mortality rate (per 1000 live births),” accessed June 1, 2014, http://data.worldbank.org/indicator/SP.DYN.IMRT.IN.

[7] World Bank, “Under 5 mortality rate (per 1000 live births),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.DYN.MORT.

[8] World Health Organization: Global Health Observatory Data Repository, “Children aged <5 years underweight: Data by country,” accessed June 1, 2014, http://apps.who.int/gho/data/node.main.522. *2000 Data. **2002 Data. ***2004 Data. ****2006 Data. *****2007 Data. ******2008 Data. *******2011 Data.

[9] World Bank, “Measles immunization (% of children 12-23 months),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.IMM.MEAS. *2011 Data.

[10] World Bank, “Life expectancy at birth (years),” accessed June 1, 2014, http://data.worldbank.org/indicator/SP.DYN.LE00.IN.

APPENDIX C

1990 THROUGH 2010 COMPARISONS

	Maternal Mortality Ratio[1]			Infant Mortality Rate[2]			U5 Mortality Rate[3]			
	1990	2010	Percent Δ	1990	2010	Percent Δ	1990	2010	Percent Δ	
Rawanda	1400	390	72.1	92	44	52.2	151	64	57.6	
Nepal	790	220	72.2	99	36	63.6	142	46	67.6	
Uganda	670	410	38.8	107	51	52.3	178	78	56.2	
South Sudan	1800	830	53.9	149	71	52.3	251	112	55.4	
Sierra Leone	2300	1200	47.8	153	123	19.6	257	193	24.9	
Comoros	630	380	39.7	87	61	29.9	124	83	33.1	
Haiti	670	420	37.3	100	73	27.0	144	175	-21.5	82 (2009), 78 (2011)
Ethiopia	1400	500	64.3	121	51	57.9	204	76	62.7	
Eritrea	1700	450	73.5	92	40	56.5	150	56	62.7	
Guinea-Bisseau	930	600	35.5	122	85	30.3	206	137	33.5	
Mozambique	1300	540	58.5	155	71	54.2	233	101	56.7	
Guinea	1100	690	37.3	142	70	50.7	241	110	54.4	
Afghanistan	1200	500	58.3	120	74	38.3	184	104	43.5	
Mali	1100	600	45.5	130	83	36.2	253	138	45.5	
Togo	660	480	27.3	89	65	27.0	143	101	29.4	
Madagascar	740	480	35.1	97	44	54.6	159	63	60.4	
Tokelau	NA	0	NA	NA	0	NA	NA	0	NA	
Malawi	1100	540	50.9	143	53	62.9	244	83	66.0	
Niger	1000	690	31.0	137	67	51.1	326	127	61.0	
Liberia	1200	680	43.3	165	61	63.0	248	83	66.5	
Central African Republic	1200	960	20.0	113	95	15.9	171	138	19.3	
Burundi	1300	820	36.9	100	71	29.0	164	112	31.7	
Zimbabwe	520	610	-17.3	50	59	-18.0	74	97	-31.1	
Somalia	1300	930	28.5	107	96	10.3	177	156	11.9	
Dem. Republic of the Congo	1000	810	19.0	112	105	6.3	171	155	9.4	

[1] World Bank, "Maternal mortality ratio (modeled estimate per 100,000 live births)," accessed June 1, 2014, http://data.worldbank.org/indicator/SH.STA.MMRT.

[2] World Bank, "Infant mortality rate (per 1000 live births)," accessed June 1, 2014, http://data.worldbank.org/indicator/SP.DYN.IMRT.IN.

[3] World Bank, "Under 5 mortality rate (per 1000 live births)," accessed June 1, 2014, http://data.worldbank.org/indicator/SH.DYN.MORT.

APPENDIX D

DATA FOR ANALYSIS

States with / without Insurgency 2008[a]		Elements of Healthcare Production				Potential Aid Interventions					
		Labor Force Participation Rate[1]	GNI Per Capita[2]	Arable Land (Hectares per person)[3]	Physician Density (per 1000 Population)[4]	Under 5 Mortality Rate[5]	Measels Vaccine Coverage Rate (% Children 12-23 Months)[6]	Children Malnutrition (% under 5 Underweight)[7]	Improved Drinking water Sources (% of Population with Access)[8]	Improved Sanitation Sources (% of Population with Access)[9]	Hospital Beds (per 1000 Population)[10]
	Afghanistan	49	510	0.27	0.2	104	62	32.9*	57	28	0.4
	Columbia	70	5460	0.04	1.5	19	88	3.4	91	79	1.4*
	India	58	1250	0.13	0.6	61	74	43.5**	91	34	0.7*
	Iraq	44	4480	0.13	0.6	36	74	7.1**	84	83	1.3
	Ivory coast	68	1220	0.15	0.1	114	70	29.4****	80	21	0.4****
	Nigeria	56	1460	0.23	0.4	124	56	24.4*****	63	29	0.53****
	Pakistan	56	1060	0.12	0.8	90	82	30.9*****	91	47	0.6
	Palestine (West Bank)	42	1340*	0.01	1.3********	27*	99*	4.0*****	82	94	1.3*****
	Philippines	66	2060	0.06	1.2****	32	80	20.2*****	92	74	1.0*
	Somalia	58	110**	0.11	0.0	156	46	32.8**	31	23	0.0
	Sri Lanka	59	2260	0.06	0.7	10	99	21.1****	94	90	3.6**
	Sudan	54	950	0.41	0.3	78	90	27.0**	55	22	0.8**
	Thailand	78	4320	0.24	0.4	14	98	7.0**	96	93	2.1
	Uganda	78	470	0.20	0.1	78	73	14.1*****	72	33	0.5
	Bangladesh	73	690	0.05	0.3	47	94	36.8*****	83	55	0.6*
	Cambodia	85	740	0.28	0.2	44	93	29.0*****	66	33	0.8
	Chad	77	920	0.38	0.0****	159	46	33.9*	50	12	0.4*********
	Eritrea	86	310	0.12	0.0****	56	99	34.5**********	60*	13*	0.7*
	Ethiopia	86	340	0.16	0.0	76	66	29.2*****	48	21	6.3*
	Haiti	67	650	0.10	0.3*	175	58	11.6*******	62	24	1.3******
	Kenya	67	800	0.13	0.2*******	79	86	16.4********	60	29	1.4
	Kyrgyzstan	70	840	0.23	2.3	31	99	4.7********	88	92	4.8*
	Madagascar	90	420	0.17	0.2	63	73	36.8*	48	13	0.2
	Myanmar	82	811***	0.21	0.5	56	88	22.6	83	75	0.6**********
	Rwanda	88	510	0.11	0.1	64	95	11.7*****	70	61	1.6******
	Sierra Leone	69	450	0.19	0.0	193	80	18.6	58	13	0.4**********
	Tajikistan	70	720	0.11	2.1	63	94	8.3********	70	94	5.2*******
	Zimbabwe	87	470	0.31	0.1******	97	90	10.1*****	80	40	1.7*
	Cameroon	71	1130	0.30	0.1******	103	79	15.1*****	72	45	1.3
	Djibouti	54	1030*	0.00	0.2	86	85	29.8*******	92	61	1.4
	El Salvador	65	3350	0.11	1.6	17	92	6.6**********	90	70	1.0
	Georgia	68	2680	0.09	4.8	22	94	1.1********	97	94	3.1*******
	Indonesia	70	2500	0.10	0.3	34	75	18.6	84	57	0.6
	Jordan	44	4140	0.03	2.6	20	98	3.0*******	96	98	1.8
	Mexico	64	8700	0.21	2.0	17	95	2.8*******	94	84	1.7
	Nicaragua	65	1430	0.33	0.4**	26	99	5.7****	85	52	0.8
	South Africa	55	5990	0.25	0.8*******	53	74	8.7*********	94	73	2.8*********
	Tunisia	51	4150	0.27	1.2	18	97	3.3**	96	89	2.1
	Turkey	52	9980	0.30	1.5	16	97	3.5*	100	91	2.5
	Ukraine	67	2990	0.71	3.2	12	56	0.9**********	98	94	8.7******
	Venezuela	68	11520	0.09	1.9*********	16	79	2.9********	93*	91*	1.1*******
	Yemen	50	1220	0.06	0.2	64	73	43.1*********	92	53	1.5*******
	Australia	77	46380	1.93	3.9	5	94	0.2****	100	100	3.9
	Bahrain	72	18810	0.00	1.5	10	99	7.6**********	100	99	1.8*******
	Barbados	81	15710	0.04	1.8	19	85	5.3**********	100	92*	6.6
	Canada	78	43400	1.28	2.1	6	97	1.8**********	100	100	2.7
	Chile	66	10720	0.07	1.0	9	93	0.5********	98	98	2.0
	Croatia	64	13550	0.20	2.7	5	96	0.5**********	99	98	5.6
	Czech Republic	70	18450	0.30	3.7	4	98	2.1**********	100	100	7.0
	Equitorial Guinea	88	9840	0.19	0.3****	107	51	10.6*	51*	89*	2.1
	Japan	74	42190	0.03	2.3	3	94	3*******	100	100	13.7*******
	Oman	62	19820	0.01	2.0	12	99	8.6********	93	97	0.7
	Saudi Arabia	53	19360	0.10	0.9	10	98	5.3**	97	100	2.2*******
	Singapore	73	43980	0.00	1.9	3	95	3.3**********	100	100	2.0*
	United States	73	48960	0.52	2.4	7	92	1.3*	99	100	3.0
	Uruguay	76	10110	0.50	3.7	9	94	4.5*****	99	96	1.2

[a] David C. Gompert et al., *War by Other Means: Building Complete and Balanced Capabilities for Counterinsurgency* (Arlington, VA: Rand National Defense Research Institute, 2008), 373-376.

[1] World Bank, "Labor force participation rate," accessed June 1, 2014, http://data.worldbank.org/indicator/SL.TLF.ACTI.ZS.

[2] World Bank, "GNI per Capita (Atlas Method)," accessed June 1, 2014, http://data.worldbank.org/indicator/NY.GNP.PCAP.CD. *2005 Data, ****2009 Data.
**2010 Data from: UN Data: A World of Information, "Somalia," accessed June 1, 2014, http://data.un.org/CountryProfile.aspx?crName=Somalia.
***2010 Data from: Knoema: World Data Atlas, "Myanmar: GDP per capita," accessed June 1, 2014, http://knoema.com/atlas/Myanmar/GDP-per-capita.

[3] World Bank, “Arable land (Hectares per person),” accessed June 1, 2014, http://data.worldbank.org/indicator/AG.LND.ARBL.HA.PC.

[4] World Bank, “Physician density (per 1000 population),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.MED.PHYS.ZS. *1998 Data. **2003 Data. ***2004 Data. ****2006 Data. *****2009 Data. ******2011 Data. *******2011 Data from: Palestinian Central Bureau of Statistics (PCBS), “On the 65th Anniversary of the Palestinian Nakba,” accessed June 1, 2014, http://www.pcbs.gov.ps/site/512/default.aspx?tabID=512&lang=en&ItemID=788&mid=3171&wversion=Staging. ********2001 Data.

[5] World Health Organization: Global Health Observatory Data Repository, “Under 5 mortality rate (probability of dying by age 5 per 1000 live births),” accessed June 1, 2014, http://apps.who.int/gho/data/node.main.ChildMort-2?lang=en. *2008 Data from: World Health Organization, “Cooperation Strategy at a Glance: West Bank and Gaza,” May 2010, accessed June 1, 2014, http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_wbg_en.pdf.

[6] World Bank, “Measles vaccine coverage rate (% children 12-23 months),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.IMM.MEAS. *2012 Data from: Dr. Ala Alwan, “Demographic, Social and Health Indicators for Countries of the Eastern Mediterranean,” World Health Organization Eastern Regional Mediterranean Office, 2013, 9, accessed February 16, 2014, http://applications.emro.who.int/ dsaf/EMROPUB_2013_EN_1537.pdf.

[7] World Health Organization: Global Health Observatory Data Repository, “Children aged <5 years underweight: Data by country,” accessed June 1, 2014, http://apps.who.int/gho/data/node.main.522. *2004 Data. **2006 Data. ***2007 Data. ****2011 Data. *****2005 Data from: Palestinian National Authority Ministry of Health, World Health Organization, and UNICEF, “State of Nutrition: West Bank and Gaza Strip,” June 2005, 4, accessed June 1, 2014, http://www.who.int/hac/crises/international/wbgs/oPt_Review_of_nutrition_situation_June2005.pdf. ******2012 Data. *******2009 Data. ********2003 Data. *********2008 Data. **********2002 Data. ***********2000 Data. ************1995 Data. *************1981 Data. **************1972 Data. ***************2001 Data.

[8] World Bank, “Access to improved drinking water (%),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.H2O.SAFE.ZS. *2005 Data.

[9] World Bank, “Access to improved sanitation (%),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.STA.ACSN?page=2. *2005 Data.

[10] World Bank, “Hospital beds (per 1000 people),” accessed June 1, 2014, http://data.worldbank.org/indicator/SH.MED.BEDS.ZS. *2011 Data. **2012 Data. ***2004 Data (Nigeria) and 2006 Data (Ivory Coast) from: Central Intelligence Agency

(CIA) “Hospital Bed Density,” World Factbook, accessed June 1, 2014, https://www.cia.gov/library/ publications/the-world-factbook/fields/2227.html.
****2011 Data from: Palestinian Central Bureau of Statistics (PCBS), “On the 65th Anniversary of the Palestinian Nakba,” accessed June 1, 2014, http://www.pcbs.gov.ps/site/512/default.aspx?tabID=512&lang=en&ItemID=788&mid=3171&wversion=Staging
*****2007 Data. ******2009 Data. *******2005 Data. ********2006 Data.

APPENDIX E

STATISTICAL ANALYSIS

One-way ANOVA: Labor Force Participation Rate versus Code

```
Source  DF      SS      MS      F      P
Code     3  3395.3  1131.8  12.62  0.000
Error   52  4664.6    89.7
Total   55  8060.0

S = 9.471   R-Sq = 42.13%   R-Sq(adj) = 38.79%

                                    Individual 95% CIs For Mean Based on
                                    Pooled StDev
Level            N    Mean   StDev   --+---------+---------+---------+-------
Control-High    14  71.929   8.704                 (-----*-----)
Control-Low     14  78.000   8.901                        (------*-----)
Control-Medium  14  60.286   8.879    (-----*------)
Insurgency      14  59.714  11.180   (------*-----)
                                     --+---------+---------+---------+-------
                                    56.0      64.0      72.0      80.0

Pooled StDev = 9.471

Hsu's MCB (Multiple Comparisons with the Best)

Family error rate = 0.05
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level            Lower   Center   Upper
Control-High    -13.627   -6.071   1.484
Control-Low      -1.484    6.071  13.627
Control-Medium  -25.270  -17.714   0.000
Insurgency      -25.841  -18.286   0.000

Level           ------+---------+---------+---------+---
Control-High                (-------*------)
Control-Low                            (------*-------)
Control-Medium   (------*-----------------)
Insurgency      (-------*-----------------)
                ------+---------+---------+---------+---
                    -20       -10         0        10

Grouping Information Using Tukey Method

Code             N    Mean  Grouping
Control-Low     14  78.000  A
Control-High    14  71.929  A
Control-Medium  14  60.286    B
Insurgency      14  59.714    B

Means that do not share a letter are significantly different.

Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code
```

```
Individual confidence level = 98.94%

Code = Control-High subtracted from:

Code              Lower   Center   Upper
Control-Low      -3.421    6.071  15.564
Control-Medium  -21.135  -11.643  -2.150
Insurgency      -21.707  -12.214  -2.722

Code            ---------+---------+---------+---------+
Control-Low                      (-----*-----)
Control-Medium       (-----*------)
Insurgency           (-----*-----)
                ---------+---------+---------+---------+
                       -15         0        15        30

Code = Control-Low subtracted from:

Code              Lower   Center   Upper
Control-Medium  -27.207  -17.714  -8.222
Insurgency      -27.778  -18.286  -8.793

Code            ---------+---------+---------+---------+
Control-Medium   (-----*------)
Insurgency      (------*-----)
                ---------+---------+---------+---------+
                       -15         0        15        30

Code = Control-Medium subtracted from:

Code          Lower  Center  Upper  ---------+---------+---------+---------+
Insurgency  -10.064  -0.571  8.921              (------*-----)
                                   ---------+---------+---------+---------+
                                          -15         0        15        30
```

One-way ANOVA: GNI Per Capita versus Code

```
Source  DF          SS          MS      F      P
Code     3  5902910453  1967636818  31.79  0.000
Error   52  3218670975    61897519
Total   55  9121581428

S = 7867   R-Sq = 64.71%   R-Sq(adj) = 62.68%

                                  Individual 95% CIs For Mean Based on
                                  Pooled StDev
Level            N   Mean  StDev  ----+---------+---------+---------+-----
Control-High    14  25806  15265                            (---*---)
Control-Low     14    619    199  (----*---)
Control-Medium  14   4344   3437      (---*----)
Insurgency      14   1928   1652    (---*---)
                                  ----+---------+---------+---------+-----
                                      0     10000     20000     30000

Pooled StDev = 7867

Hsu's MCB (Multiple Comparisons with the Best)

Family error rate = 0.05
```

```
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level            Lower  Center  Upper
Control-High         0   21462  27738
Control-Low     -31463  -25186      0
Control-Medium  -27738  -21462      0
Insurgency      -30154  -23878      0

Level               -+---------+---------+---------+--------
Control-High                              (-------------*---)
Control-Low         (---*----------------)
Control-Medium         (---*-------------)
Insurgency           (---*---------------)
                    -+---------+---------+---------+--------
                -30000    -15000         0     15000

Grouping Information Using Tukey Method

Code             N   Mean  Grouping
Control-High    14  25806  A
Control-Medium  14   4344    B
Insurgency      14   1928    B
Control-Low     14    619    B

Means that do not share a letter are significantly different.

Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code

Individual confidence level = 98.94%

Code = Control-High subtracted from:

Code             Lower  Center   Upper
Control-Low     -33071  -25186  -17301
Control-Medium  -29347  -21462  -13577
Insurgency      -31763  -23878  -15993

Code            --------+---------+---------+---------+-
Control-Low     (------*------)
Control-Medium      (-----*------)
Insurgency        (-----*------)
                --------+---------+---------+---------+-
                   -24000    -12000         0     12000

Code = Control-Low subtracted from:

Code            Lower  Center  Upper  --------+---------+---------+---------+-
Control-Medium  -4161    3724  11609                          (-----*------)
Insurgency      -6577    1309   9194                        (-----*------)
                                     --------+---------+---------+---------+-
                                        -24000    -12000         0     12000

Code = Control-Medium subtracted from:

Code         Lower  Center  Upper  --------+---------+---------+---------+-
Insurgency  -10301   -2416   5469                    (------*------)
                                  --------+---------+---------+---------+-
                                     -24000    -12000         0     12000
```

One-way ANOVA: Arable Land versus Code

```
Source  DF      SS      MS     F      P
Code     3  0.3933  0.1311  1.40  0.252
Error   52  4.8532  0.0933
Total   55  5.2465

S = 0.3055   R-Sq = 7.50%   R-Sq(adj) = 2.16%

                                      Individual 95% CIs For Mean Based on
                                      Pooled StDev
Level            N    Mean   StDev   -+---------+---------+---------+--------
Control-High    14  0.3693  0.5656                (----------*----------)
Control-Low     14  0.1821  0.0920     (----------*----------)
Control-Medium  14  0.2036  0.1830       (----------*----------)
Insurgency      14  0.1543  0.1074   (----------*----------)
                                      -+---------+---------+---------+--------
                                      0.00      0.15      0.30      0.45

Pooled StDev = 0.3055

Hsu's MCB (Multiple Comparisons with the Best)

Family error rate = 0.05
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level            Lower   Center   Upper
Control-High    -0.0780   0.1657  0.4094
Control-Low     -0.4309  -0.1871  0.0566
Control-Medium  -0.4094  -0.1657  0.0780
Insurgency      -0.4587  -0.2150  0.0287

Level           --------+---------+---------+---------+-
Control-High                   (---------*--------)
Control-Low      (---------*--------)
Control-Medium    (--------*---------)
Insurgency      (--------*---------)
                --------+---------+---------+---------+-
                     -0.25      0.00      0.25      0.50

Grouping Information Using Tukey Method

Code             N    Mean  Grouping
Control-High    14  0.3693  A
Control-Medium  14  0.2036  A
Control-Low     14  0.1821  A
Insurgency      14  0.1543  A

Means that do not share a letter are significantly different.

Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code

Individual confidence level = 98.94%

Code = Control-High subtracted from:
```

```
Code              Lower   Center   Upper
Control-Low     -0.4933  -0.1871  0.1190
Control-Medium  -0.4719  -0.1657  0.1405
Insurgency      -0.5212  -0.2150  0.0912

Code              -+---------+---------+---------+--------
Control-Low        (------------*-----------)
Control-Medium       (-----------*------------)
Insurgency        (-----------*------------)
                  -+---------+---------+---------+--------
                -0.50     -0.25      0.00      0.25

Code = Control-Low subtracted from:

Code              Lower   Center   Upper
Control-Medium  -0.2848   0.0214  0.3276
Insurgency      -0.3340  -0.0279  0.2783

Code              -+---------+---------+---------+--------
Control-Medium              (-----------*-----------)
Insurgency                (-----------*-----------)
                  -+---------+---------+---------+--------
                -0.50     -0.25      0.00      0.25

Code = Control-Medium subtracted from:

Code           Lower   Center   Upper
Insurgency  -0.3555  -0.0493  0.2569

Code           -+---------+---------+---------+--------
Insurgency            (-----------*-----------)
               -+---------+---------+---------+--------
             -0.50     -0.25      0.00      0.25
```

One-way ANOVA: Physician Density versus Code

```
Source  DF      SS     MS     F      P
Code     3  27.075  9.025  9.48  0.000
Error   52  49.504  0.952
Total   55  76.578

S = 0.9757   R-Sq = 35.36%   R-Sq(adj) = 31.63%

                                    Individual 95% CIs For Mean Based on
                                    Pooled StDev
Level            N    Mean   StDev   -+---------+---------+---------+--------
Control-High    14  2.1571  1.0811                          (-------*------)
Control-Low     14  0.4500  0.7563   (------*-------)
Control-Medium  14  1.4857  1.3581                 (------*-------)
Insurgency      14  0.5857  0.4721     (------*-------)
                                     -+---------+---------+---------+--------
                                    0.00      0.70      1.40      2.10

Pooled StDev = 0.9757

Hsu's MCB (Multiple Comparisons with the Best)

Family error rate = 0.05
```

```
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level             Lower   Center   Upper
Control-High    -0.1069   0.6714  1.4498
Control-Low     -2.4855  -1.7071  0.0000
Control-Medium  -1.4498  -0.6714  0.1069
Insurgency      -2.3498  -1.5714  0.0000

Level           -----+---------+---------+---------+----
Control-High                          (-------*------)
Control-Low     (-------*----------------)
Control-Medium             (------*-------)
Insurgency        (------*---------------)
                -----+---------+---------+---------+----
                  -2.0      -1.0       0.0       1.0

Grouping Information Using Tukey Method

Code             N    Mean  Grouping
Control-High    14  2.1571  A
Control-Medium  14  1.4857  A B
Insurgency      14  0.5857    B C
Control-Low     14  0.4500      C

Means that do not share a letter are significantly different.

Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code

Individual confidence level = 98.94%

Code = Control-High subtracted from:

Code              Lower   Center    Upper
Control-Low     -2.6850  -1.7071  -0.7293
Control-Medium  -1.6493  -0.6714   0.3064
Insurgency      -2.5493  -1.5714  -0.5936

Code             --+---------+---------+---------+-------
Control-Low      (-------*-------)
Control-Medium           (-------*--------)
Insurgency        (-------*-------)
                 --+---------+---------+---------+-------
                -2.4      -1.2       0.0       1.2

Code = Control-Low subtracted from:

Code              Lower  Center   Upper
Control-Medium   0.0578  1.0357  2.0136
Insurgency      -0.8422  0.1357  1.1136

Code             --+---------+---------+---------+-------
Control-Medium                         (--------*-------)
Insurgency                    (-------*-------)
                 --+---------+---------+---------+-------
                -2.4      -1.2       0.0       1.2
```

```
Code = Control-Medium subtracted from:

Code          Lower   Center   Upper   --+---------+---------+---------+-------
Insurgency  -1.8779  -0.9000  0.0779         (-------*--------)
                                        --+---------+---------+---------+-------
                                       -2.4      -1.2       0.0       1.2
```

One-way ANOVA: Under-five Mortality Rate versus Code

```
Source  DF      SS     MS     F      P
Code     3   42192  14064  8.84  0.000
Error   52   82727   1591
Total   55  124919

S = 39.89   R-Sq = 33.78%   R-Sq(adj) = 29.95%

                                  Individual 95% CIs For Mean Based on
                                  Pooled StDev
Level            N   Mean  StDev  --+---------+---------+---------+-------
Control-High    14  14.93  26.84  (------*------)
Control-Low     14  85.93  51.61                        (------*------)
Control-Medium  14  36.00  29.14         (------*------)
Insurgency      14  67.36  46.16                  (------*-------)
                                  --+---------+---------+---------+-------
                                    0        30        60        90

Pooled StDev = 39.89

Hsu's MCB (Multiple Comparisons with the Best)

Family error rate = 0.05
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level            Lower  Center  Upper
Control-High    -102.82  -71.00   0.00
Control-Low      -13.25   18.57  50.39
Control-Medium   -81.75  -49.93   0.00
Insurgency       -50.39  -18.57  13.25

Level           ------+---------+---------+---------+---
Control-High    (-------*-----------------)
Control-Low                          (-------*-------)
Control-Medium        (-------*-----------)
Insurgency                  (-------*-------)
                ------+---------+---------+---------+---
                    -80       -40         0        40

Grouping Information Using Tukey Method

Code             N   Mean  Grouping
Control-Low     14  85.93  A
Insurgency      14  67.36  A B
Control-Medium  14  36.00    B C
Control-High    14  14.93      C

Means that do not share a letter are significantly different.
```

```
Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code

Individual confidence level = 98.94%

Code = Control-High subtracted from:


Code             Lower  Center   Upper
Control-Low      31.02   71.00  110.98
Control-Medium  -18.90   21.07   61.05
Insurgency       12.45   52.43   92.40

Code            -----+---------+---------+---------+----
Control-Low                        (------*-----)
Control-Medium              (------*-----)
Insurgency                       (------*-----)
                -----+---------+---------+---------+----
                   -60         0        60       120

Code = Control-Low subtracted from:

Code             Lower  Center  Upper  -----+---------+---------+---------+----
Control-Medium  -89.90  -49.93  -9.95  (------*-----)
Insurgency      -58.55  -18.57  21.40       (------*------)
                                       -----+---------+---------+---------+----
                                          -60         0        60       120


Code = Control-Medium subtracted from:

Code        Lower  Center  Upper  -----+---------+---------+---------+----
Insurgency  -8.62   31.36  71.33               (-----*------)
                                  -----+---------+---------+---------+----
                                     -60         0        60       120
```

One-way ANOVA: Measles Vaccine Coverage Rate versus Code

```
Source  DF     SS   MS     F      P
Code     3   1389  463  2.18  0.101
Error   52  11027  212
Total   55  12416

S = 14.56   R-Sq = 11.19%   R-Sq(adj) = 6.07%

                                  Individual 95% CIs For Mean Based on
                                  Pooled StDev
Level            N   Mean  StDev   --+---------+---------+---------+-------
Control-High    14  91.79  12.29                    (---------*--------)
Control-Low     14  82.93  16.34          (---------*--------)
Control-Medium  14  85.21  12.89             (---------*--------)
Insurgency      14  77.93  16.25   (--------*---------)
                                   --+---------+---------+---------+-------
                                  72.0      80.0      88.0      96.0

Pooled StDev = 14.56


Hsu's MCB (Multiple Comparisons with the Best)
```

```
Family error rate = 0.05
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level            Lower  Center  Upper
Control-High     -5.05    6.57  18.19
Control-Low     -20.47   -8.86   2.76
Control-Medium  -18.19   -6.57   5.05
Insurgency      -25.47  -13.86   0.00

Level            -+---------+---------+---------+--------
Control-High                      (--------*---------)
Control-Low           (---------*--------)
Control-Medium          (---------*--------)
Insurgency       (--------*-----------)
                 -+---------+---------+---------+--------
                -24       -12         0        12
Grouping Information Using Tukey Method

Code             N   Mean  Grouping
Control-High    14  91.79  A
Control-Medium  14  85.21  A
Control-Low     14  82.93  A
Insurgency      14  77.93  A

Means that do not share a letter are significantly different.

Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code

Individual confidence level = 98.94%

Code = Control-High subtracted from:

Code             Lower  Center  Upper  ---------+---------+---------+---------+
Control-Low     -23.45   -8.86   5.74     (---------*---------)
Control-Medium  -21.17   -6.57   8.02       (---------*---------)
Insurgency      -28.45  -13.86   0.74  (---------*--------)
                                       ---------+---------+---------+---------+
                                              -15         0        15        30

Code = Control-Low subtracted from:

Code             Lower  Center  Upper  ---------+---------+---------+---------+
Control-Medium  -12.31    2.29  16.88            (---------*--------)
Insurgency      -19.59   -5.00   9.59       (---------*--------)
                                       ---------+---------+---------+---------+
                                              -15         0        15        30

Code = Control-Medium subtracted from:

Code         Lower  Center  Upper  ---------+---------+---------+---------+
Insurgency  -21.88   -7.29   7.31      (---------*---------)
                                   ---------+---------+---------+---------+
                                          -15         0        15        30
```

One-way ANOVA: Child Malnutrition versus Code

```
Source  DF    SS    MS     F      P
Code     3  3184  1061  9.33  0.000
Error   52  5916   114
Total   55  9100

S = 10.67   R-Sq = 34.99%   R-Sq(adj) = 31.24%


                                  Individual 95% CIs For Mean Based on
                                  Pooled StDev
Level            N   Mean  StDev  --+---------+---------+---------+-------
Control-High    14   3.90   3.25  (------*------)
Control-Low     14  21.73  11.51                       (------*------)
Control-Medium  14  10.36  12.46           (------*------)
Insurgency      14  21.27  12.52                     (-------*------)
                                  --+---------+---------+---------+-------
                                  0.0       8.0      16.0      24.0

Pooled StDev = 10.67

Hsu's MCB (Multiple Comparisons with the Best)

Family error rate = 0.05
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level            Lower  Center  Upper  ------+---------+---------+---------+---
Control-High    -26.34  -17.83   0.00  (-------*-----------------)
Control-Low      -8.05    0.46   8.97                    (-------*--------)
Control-Medium  -19.87  -11.36   0.00        (--------*----------)
Insurgency       -8.97   -0.46   8.05                  (--------*-------)
                                      ------+---------+---------+---------+---
                                          -20       -10         0        10

Grouping Information Using Tukey Method

Code             N   Mean  Grouping
Control-Low     14  21.73  A
Insurgency      14  21.27  A
Control-Medium  14  10.36     B
Control-High    14   3.90     B

Means that do not share a letter are significantly different.

Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code

Individual confidence level = 98.94%

Code = Control-High subtracted from:

Code             Lower  Center  Upper  -----+---------+---------+---------+----
Control-Low       7.14   17.83  28.52                     (------*------)
Control-Medium   -4.23    6.46  17.15              (------*------)
Insurgency        6.68   17.37  28.06                    (-------*------)
                                     -----+---------+---------+---------+----
                                        -15         0        15        30
```

```
Code = Control-Low subtracted from:

Code             Lower  Center  Upper  -----+---------+---------+---------+----
Control-Medium  -22.05  -11.36  -0.67  (------*-------)
Insurgency      -11.15   -0.46  10.23          (------*------)
                                       -----+---------+---------+---------+----
                                          -15         0        15        30



Code = Control-Medium subtracted from:

Code        Lower  Center  Upper  -----+---------+---------+---------+----
Insurgency   0.22   10.91  21.60                (------*------)
                                  -----+---------+---------+---------+----
                                     -15         0        15        30
```

One-way ANOVA: Improved Drinking Water Sources versus Code

```
Source  DF     SS    MS      F      P
Code     3   7668  2556  13.34  0.000
Error   52   9967   192
Total   55  17636

S = 13.84   R-Sq = 43.48%   R-Sq(adj) = 40.22%

                                  Individual 95% CIs For Mean Based on
                                  Pooled StDev
Level            N   Mean  StDev  -+---------+---------+---------+--------
Control-High    14  95.43  12.93                          (------*-----)
Control-Low     14  66.14  13.43  (-----*-----)
Control-Medium  14  91.64   7.24                       (-----*------)
Insurgency      14  77.07  19.15           (-----*-----)
                                  -+---------+---------+---------+--------
                                  60        72        84        96

Pooled StDev = 13.84

Hsu's MCB (Multiple Comparisons with the Best)

Family error rate = 0.05
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level            Lower  Center  Upper  -------+---------+---------+---------+--
Control-High     -7.26    3.79  14.83                        (-------*------)
Control-Low     -40.33  -29.29   0.00  (------*--------------------)
Control-Medium  -14.83   -3.79   7.26                   (------*-------)
Insurgency      -29.40  -18.36   0.00         (-------*-----------)
                                       -------+---------+---------+---------+--
                                            -30       -15         0        15

Grouping Information Using Tukey Method

Code             N   Mean  Grouping
Control-High    14  95.43  A
Control-Medium  14  91.64  A
Insurgency      14  77.07     B
Control-Low     14  66.14     B
```

```
Means that do not share a letter are significantly different.

Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code

Individual confidence level = 98.94%

Code = Control-High subtracted from:

Code             Lower  Center   Upper
Control-Low     -43.16  -29.29  -15.41
Control-Medium  -17.66   -3.79   10.09
Insurgency      -32.23  -18.36   -4.48

Code            -------+---------+---------+---------+--
Control-Low     (----*-----)
Control-Medium            (----*-----)
Insurgency          (-----*----)
                -------+---------+---------+---------+--
                     -25         0        25        50

Code = Control-Low subtracted from:

Code            Lower  Center  Upper  -------+---------+---------+---------+--
Control-Medium  11.62   25.50  39.38                      (----*-----)
Insurgency      -2.95   10.93  24.80                (----*-----)
                                     -------+---------+---------+---------+--
                                          -25         0        25        50

Code = Control-Medium subtracted from:

Code         Lower  Center  Upper  -------+---------+---------+---------+--
Insurgency  -28.45  -14.57  -0.70        (----*-----)
                                  -------+---------+---------+---------+--
                                       -25         0        25        50
```

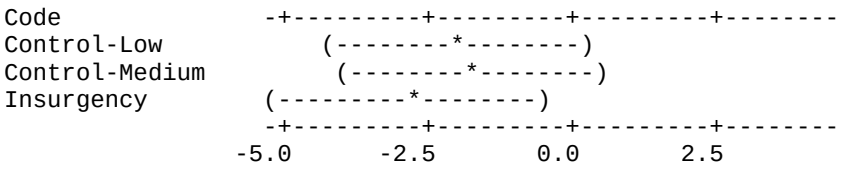
One-way ANOVA: Improved Sanitation Sources versus Code

```
Source  DF     SS    MS      F      P
Code     3  26133  8711  16.50  0.000
Error   52  27450   528
Total   55  53583

S = 22.98   R-Sq = 48.77%   R-Sq(adj) = 45.82%

                                Individual 95% CIs For Mean Based on
                                Pooled StDev
Level            N   Mean  StDev  ---------+---------+---------+---------+
Control-High    14  97.79   3.40                          (----*----)
Control-Low     14  41.07  29.42  (----*----)
Control-Medium  14  75.14  18.61               (----*----)
Insurgency      14  53.57  29.80      (----*----)
                                   ---------+---------+---------+---------+
                                          50        75       100       125

Pooled StDev = 22.98


Hsu's MCB (Multiple Comparisons with the Best)
```

```
Family error rate = 0.05
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level            Lower  Center  Upper  -----+---------+---------+---------+----
Control-High      0.00   22.64  40.97                          (-------*-----)
Control-Low     -75.04  -56.71   0.00  (-----*------------------)
Control-Medium  -40.97  -22.64   0.00            (-----*-------)
Insurgency      -62.54  -44.21   0.00      (-----*--------------)
                                         -----+---------+---------+---------+----
                                            -60       -30         0        30

Grouping Information Using Tukey Method

Code             N   Mean  Grouping
Control-High    14  97.79  A
Control-Medium  14  75.14  A B
Insurgency      14  53.57    B C
Control-Low     14  41.07      C

Means that do not share a letter are significantly different.

Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code

Individual confidence level = 98.94%

Code = Control-High subtracted from:

Code             Lower  Center   Upper
Control-Low     -79.74  -56.71  -33.69
Control-Medium  -45.67  -22.64    0.38
Insurgency      -67.24  -44.21  -21.19

Code            ---+---------+---------+---------+------
Control-Low     (------*-----)
Control-Medium           (------*-----)
Insurgency          (-----*------)
                ---+---------+---------+---------+------
                 -70       -35         0        35

Code = Control-Low subtracted from:

Code             Lower  Center  Upper  ---+---------+---------+---------+------
Control-Medium   11.04   34.07  57.10                           (------*-----)
Insurgency      -10.53   12.50  35.53                     (------*-----)
                                       ---+---------+---------+---------+------
                                        -70       -35         0        35

Code = Control-Medium subtracted from:

Code         Lower  Center  Upper  ---+---------+---------+---------+------
Insurgency  -44.60  -21.57   1.46           (------*-----)
                                  ---+---------+---------+---------+------
                                   -70       -35         0        35
```

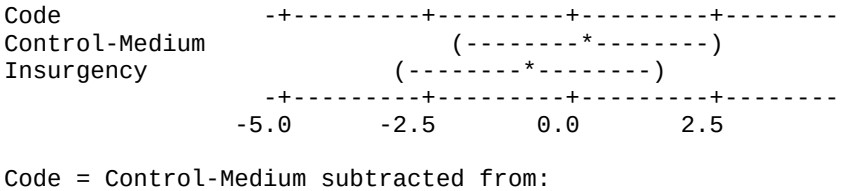
One-way ANOVA: Hospital Beds versus Code

```
Source  DF      SS     MS     F      P
Code     3   60.32  20.11  3.88  0.014
Error   52  269.64   5.19
Total   55  329.96

S = 2.277   R-Sq = 18.28%   R-Sq(adj) = 13.57%

                                  Individual 95% CIs For Mean Based on
                                  Pooled StDev
Level            N   Mean  StDev   -+---------+---------+---------+--------
Control-High    14  3.893  3.435                     (-------*-------)
Control-Low     14  1.857  2.015        (-------*--------)
Control-Medium  14  2.193  2.014          (--------*-------)
Insurgency      14  1.045  0.910   (-------*-------)
                                   -+---------+---------+---------+--------
                                  0.0       1.5       3.0       4.5

Pooled StDev = 2.277

Hsu's MCB (Multiple Comparisons with the Best)

Family error rate = 0.05
Critical value = 2.11

Intervals for level mean minus largest of other level means

Level            Lower  Center  Upper  ---------+---------+---------+---------+
Control-High    -0.117   1.700  3.517                    (------*------)
Control-Low     -3.852  -2.036  0.000      (------*-------)
Control-Medium  -3.517  -1.700  0.117       (------*------)
Insurgency      -4.664  -2.848  0.000  (-------*----------)
                                       ---------+---------+---------+---------+
                                             -2.5       0.0       2.5       5.0

Grouping Information Using Tukey Method

Code             N   Mean  Grouping
Control-High    14  3.893  A
Control-Medium  14  2.193  A B
Control-Low     14  1.857  A B
Insurgency      14  1.045    B

Means that do not share a letter are significantly different.

Tukey 95% Simultaneous Confidence Intervals
All Pairwise Comparisons among Levels of Code

Individual confidence level = 98.94%

Code = Control-High subtracted from:

Code             Lower  Center   Upper
Control-Low     -4.318  -2.036   0.246
Control-Medium  -3.982  -1.700   0.582
Insurgency      -5.130  -2.848  -0.566
```



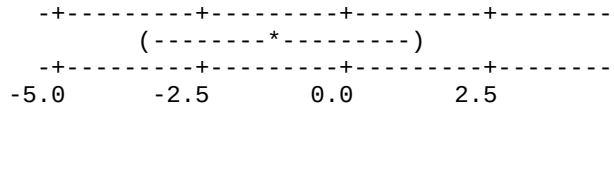
Code = Control-Low subtracted from:

Code	Lower	Center	Upper
Control-Medium	-1.946	0.336	2.618
Insurgency	-3.094	-0.812	1.470



Code = Control-Medium subtracted from:

Code	Lower	Center	Upper
Insurgency	-3.430	-1.148	1.134



BIBLIOGRAPHY

Books

Galula, David. *Counterinsurgency Warfare: Theory and Practice*. Westport, CT: Praeger Security International, 2006.

Gompert, David, C., John Gordon IV, Adam Grissom, David R. Frelinger, Seth G. Jones, Martin C. Libicki, Edward O'Connell, Brooke Sterns Lawson, and Robert Hunter. *War by Other Means: Building Complete and Balanced Capabilities for Counterinsurgency*. Arlington, VA: Rand National Defense Research Institute, 2008.

Kerry, Vanessa. *The Afghanistan Case Study.* Harvard, MA: Harvard University Press, 2013.

Kilcullen, David. *Counterinsurgency*. Oxford: Oxford University Press, 2010.

Randall, Virginia. "Maternal and Child Health in the Tropics." In *Hunter's Tropical Medicine and Emerging Infectious Diseases*, 8th ed., edited by Thomas G. Strickland, 125. Philadelphia, PA: W.B. Saunders Company, 2000.

Sphere Project. *The Sphere Project: Humanitarian Charter and Minimum Standards in Disaster Response*. Geneva, Switzerland: Oxfam Publishing, 2005.

Taber, Robert. *War of the Flea*. Washington, DC: Potomac Books, 2002.

Von Dach, H. *Total Resistance.* Boulder, CO: Paladin Press, 1965.

Periodicals

Andrus, Jon Kim. "Immunization and the Millennium Development Goals: Progress and Challenges in Latin America and the Caribbean." *Health Affairs* 27, no. 2 (March 2008): 487.

Berman, Eli, Michael Callen, Joseph H. Felter, and Jacob N. Shapiro. "Do Working Men Rebel? Insurgency and Unemployment in Afghanistan, Iraq, and the Philippines." *Journal of Conflict Resolution* 55 (March 2011): 516.

Bricknell, Martin, Col, DM. "Reflections on Medical Aspects of ISAF IX in Afghanistan." *Journal of the Royal Army Medical Corps* 153, no. 1 (2007): 49.

Davis, Kingsley. "The Amazing Decline of Mortality in Underdeveloped Areas." *The American Economic Review* 46, no. 2 (May 1956): 314.

Ferguson, Jason. “What Every Deploying Doc Should Know About: Relationships with NGOs.” *The Uniformed Family Physician* 7, no. 2 (Winter 2014): 18.

Jones, Gareth, Richard W. Steketee, Robert E. Black, Zulfiqar A. Bhutta, Saul S. Morris, and the Bellagio Child Survival Study Group. “How Many Child Deaths Can We Prevent This Year?” *Lancet* 362, no. 9377 (July 2003): 69.

Government Documents

Center for Army Lessons Learned. *Afghanistan Provincial Reconstruction Team Handbook: Observations, Insights, and Lessons* No. 11-16. Fort Leavenworth, KS: Center for Army Lessons Learned, February 2011.

Department of Defense. Department of Defense Instruction (DoDI) 3000.5, *Stability Operations*. Washington, DC: Government Printing Office, September 2009.

———. Department of Defense Instruction (DoDI) 6000.16, *Military Health Support for Stability Operations*. Washington, DC: Government Printing Office, May 2010.

Department of the Army. Army Doctrine Publication (ADP) 1, *The Army*. Washington DC: Government Printing Office, September 2012.

———. Army Doctrine Publication (ADP) 3-0, *Unified Land Operations*. Washington, DC: Government Printing Office, October 2011.

———. Army Doctrine Publication (ADP) 3-07 *Stability Operations*. Washington, DC: Government Printing Office, August 2012.

———. Army Doctrine Reference Publication (ADRP) 5-0, *The Operations Process*. Washington DC: Government Printing Office, May 2012.

———. Army Training Publication (ATP) 3-07.5, *Stability Techniques*. Washington, DC: Government Printing Office, August 2012.

———. Field Manual (FM) 3-07, *Stability Operations*. Washington, DC: Government Printing Office, October 2008.

———. Field Manual (FM) 3-24, *Insurgencies and Counter Insurgencies*. Washington, DC: Government Printing Office, May 2014.

———. Field Manual (FM) 4-02, *Army Health System*. Washington, DC: Government Printing Office, August 2013.

———. Field Manual (FM) 7-15, *The Army Universal Task List*. Washington, DC: Government Printing Office, June 2012.

———. “Task 71-8-7377: Coordinate Medical Stability (Brigade-Corps).” Accessed April 19, 2014. https://atn.army.mil.

———. Training Circular (TC) 7-100, *Hybrid Threat*. Washington, DC: Government Printing Office, November 2010.

Joint Chiefs of Staff. Joint Publication (JP) 1, *Doctrine for the Armed Forces of the United States*. Washington, DC: Government Printing Office, March 2013.

———. Joint Publication (JP) 3-0, *Joint Operations*. Washington, DC: Government Printing Office, August 2011.

———. Joint Publication (JP) 3-07, *Stability Operations*. Washington, DC: Government Printing Office, September, 2011.

———. Joint Publication (JP) 3-08, *Interorganizational Coordination During Joint Operations*. Washington, DC: Government Printing Office, June 2011.

———. Joint Publication (JP) 3-24, *Counterinsurgency*. Washington, DC: Government Printing Office, November 2013.

———. Joint Publication (JP) 3-29, *Foreign Humanitarian Assistance*. Washington, DC: Government Printing Office, January 2014.

———. Joint Publication (JP) 3-57, *Civil-Military Operations*. Washington, DC: Government Printing Office, September 2013.

———. Joint Publication (JP) 4-02, *Health Service Support*. Washington, DC: Government Printing Office, July 2012.

Matthews, Matt M. *We Were Caught Unprepared: The 2006 Hezbollah-Israeli War*. Fort Leavenworth, KS: Combat Studies Institute Press, 2008.

Tarpy, Michael J. “The Role of the U.S. Army in Health System Reconstruction and Development During Counterinsurgency.” Master’s thesis, Command and General Staff College, Fort Leavenworth, KS, 2012.

Other Sources

Afghanistan Ministry of Public Health (MoPH). “Islamic Republic of Afghanistan Ministry of Public Health Annual Report 1387.” Last modified 2009. Accessed February 22, 2014. http://moph.gov.af/Content/Media/Documents/HNSS-Report-ENG-v4-1281220101156987.pdf.

Alwan, Ala. “Demographic, Social and Health Indicators for Countries of the Eastern Mediterranean.” World Health Organization Eastern Regional Mediterranean

Office, 2013. Accessed February 16, 2014. http://applications.emro.who.int/dsaf/EMROPUB_2013_EN_1537.pdf.

Arcadu, Maria Gabriella. “Civil-Military Coordination in the Health Sector Afghanistan: A Case Study.” September 2010. Accessed March 2, 2014. http://www.4change.eu/uploads/CM_CASE_STUDY_AFG_V3_2.pdf.

Beadling, Charles W. “Director’s Statement: Center for Disaster and Humanitarian Assistance Medicine.” Accessed September 1, 2014. http://www.cdham.org/directors-statement.

Butler, Eamonn. *The Condensed Wealth of Nations*. England: Adam Smith Research Trust, 2011. Accessed June 2, 2014. http://www.adamsmith.org/sites/default/files/resources/condensed-WoN.pdf.

Cammett, Melani. “Habitat for Hezbollah.” *Foreign Policy*. August 17, 2006. Accessed February 17, 2014. http://www.foreignpolicy.com/articles/2006/08/16/habitat_for_hezbollah.

Center for Excellence in Disaster Management and Humanitarian Assistance. “About CFE-DMHA.” Accessed September 29, 2014. http://www.coe-dmha.org/about-cfe-dmha/index.html.

———. “Hierarchy of Strategies, Plans, and Doctrine for Disaster Management and Humanitarian Assistance.” Accessed September 29, 2014. http://www.coe-dmha.org/about-cfe-dmha/hierarchy-strategies-plans-doctrine-dmha.html.

Center for International Humanitarian Cooperation. “IDHA: International Diploma in Humanitarian Assistance.” Accessed September 1, 2014. http://www.cihc.org/idha.

Central Intelligence Agency (CIA). “Afghanistan.” World Factbook. Accessed February 15, 2014. https://www.cia.gov/library/publications/the-world-factbook/geos/af.html.

———.“GDP Per Capita Comparison.” World Factbook. Accessed March 2, 2014. https://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html.

———. “Hospital Bed Density.” World Factbook. Accessed June 1, 2014. https://www.cia.gov/library/ publications/the-world-factbook/fields/2227.html.

Consultive Group on the Use of Military and Civil Defense Assets. “Guidelines on the Use of Foreign Military and Civil Defense Assets in Disaster Relief–‘Oslo Guidelines’.” November 2007. Accessed September 29, 2014. http://www.refworld.org/ pdfid/47da87822.pdf.

Defense Industry Daily. “Commando Family Armored Cars for the Afghan National Army.” Last modified March 7, 2013. Accessed February 17, 2014. http://www.defenseindustrydaily.com/m1117-asvs-for-the-afghan-national-army-06750/.

Food and Agriculture Organization of the United Nations. *The Fate of Food Insecurity in the World 2013*. Rome: Food and Agriculture Organization of the United Nations, 2013. Accessed August 11, 2014. http://www.fao.org/docrep/018/i3434e/i3434e.pdf.

Graham-Harrison, Emma. “Prevalence of Malnutrition in Southern Afghanistan ‘Shocking’.” *The Guardian*, September 4, 2012. Accessed June 1, 2014. http://www.theguardian.com/world/2012/sep/04/malnutrition-southern-afghanistan-shocking-levels.

Institute for Health Metrics and Evaluation (IHME). *The Global Burden of Disease: Generating Evidence, Guiding Policy*. Seattle, WA: IHME, 2013. Accessed June 2, 2014. http://www.healthdata.org/sites/default/files/files/policy_report/2013/GBD_GeneratingEvidence/IHME_GBD_GeneratingEvidence_FullReport.pdf.

Integrated Regional Information Network (IRIN). “Lebanon: the Many Hands and Faces of Hezbollah.” *IRIN Humanitarian News and Analysis*. March 29, 2006. Accessed February 22, 2014. http://www.irinnews.org/report/26242/lebanon-the-many-hands-and-faces-of-hezbollah.

Islamic Republic of Afghanistan Ministry of Public Health. “A Basic Package of Health Services for Afghanistan.” Accessed February 22, 2014. http://moph.gov.af/Content/Media/Documents/BPHS-2005-FINAL29122010162945969.pdf.

Jamison, Dean T., Joel G. Breman, Anthony R. Measham, George Alleyne, Mariam Claeson, David B. Evans, Prabhat Jha, Anne Mills, and Philip Musgrove, eds. *Disease Control Priorities in Developing Countries.* 2nd ed. Washington, DC: World Bank, 2006. Accessed April 27, 2014. http://www.ncbi.nlm.nih.gov/books/NBK11754/.

Jamison, Dean T. M. E. Sandhu, and J. Wang. *Working Paper No. 21, Disease Control Priority Project, Why Has Infant Mortality Decreased at Such Different Rates in Different Countries?* Washington, DC: US National Institutes of Health, February 2004. Accessed March 2, 2014. http://www.dcp2.org/file/36/wp21.pdf.

Knight, Frank H. *Risk, Uncertainty, and Profit*. Boston, MA: Houghton Mifflin Publishing, 1921. Accessed June 2, 2014. http://www.econlib.org/library/Knight/knRUP8.html.

Knoema: World Data Atlas. “Myanmar: GDP per capita.” Accessed June 1, 2014. http://knoema.com/atlas/Myanmar/GDP-per-capita.

Newbrander, William. “Preventing Diarrhea that Kills Children in Rural Afghanistan.” Last modified December 14, 2010. Accessed March 9, 2014. http://www.msh.org/blog/2010/12/14/preventing-diarrhea-that-kills-children-in-rural-afghanistan.

Palestinian Central Bureau of Statistics (PCBS). “On the 65th Anniversary of the Palestinian Nakba.” Accessed June 1, 2014. http://www.pcbs.gov.ps/site/512/default.aspx?tabID=512&lang=en&ItemID=788&mid=3171&wversion=Staging.

Palestinian National Authority Ministry of Health, World Health Organization, and UNICEF. “State of Nutrition: West Bank and Gaza Strip.” June 2005. Accessed June 1, 2014. http://www.who.int/hac/crises/international/wbgs/oPt_Review_of_nutrition_situation_June2005.pdf.

Sachs, Susan. “Hezbollah Offers a Helping Hand in Southern Lebanon.” *The New York Times*, May 31, 2000. Accessed March 4, 2014. http://www.nytimes.com/2000/05/31/world/hezbollah-offers-a-helping-hand-in-southern-lebanon.html.

Siegel, Jacob, and Hanqing Chen. “The Afghan Money Pit: How Millions of Dollars Were Wasted.” *The Daily Beast*. Last modified October 30, 2013. Accessed February 15, 2014. http://www.thedailybeast.com/the-hero-project/articles/2013/10/30/the-afghan-money-pit-how-millions-of-dollars-were-wasted.html.

Tavernise, Sabrina. “Charity Wins Deep Loyalty for Hezbollah.” *The New York Times*, August 6, 2006. Accessed March 4, 2014. http://www.nytimes.com/2006/08/06/world/middleeast/06tyre.html?pagewanted=all&_r=0.

UN Data: A World of Information. “Somalia.” Accessed June 1, 2014. http://data.un.org/CountryProfile.aspx?crName=Somalia.

UNICEF, WHO, The World Bank, and UN Population Division. *Levels and Trends of Child Mortality in 2006: Estimates developed by the Inter-agency Group for Child Mortality Estimation*. New York, NY: UNICEF, December 2007. Accessed March 20, 2014. http://www.childinfo.org/files/infant_child_mortality_2006.pdf.

United Nations. “We Can End Poverty: Millenium Development Goals and Beyond 2015.” Accessed March 2, 2014. http://www.un.org/millenniumgoals/.

United Nations High Commissioner for Refugees (UNHCR). “Syrian Regional Refugee Response.” February 14, 2014. Accessed February 17, 2014. http://data.unhcr.org/syrianrefugees/country.php?id=122.

United Nations Millennium Development Goals and Beyond 2015. “Target 4.A: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate.” Accessed July 27, 2014. http://www.un.org/millenniumgoals/childhealth.shtml.

United Nations Statistics Division. “Millennium Development Goals Indicators.” Accessed March 4, 2014. http://mdgs.un.org/unsd/mdg/Metadata.aspx? IndicatorId=0&SeriesId=561.

United States Army Central Command. “USACE Completes Construction of Medical Facility in Shindand.” Last modified January 29, 2013. Accessed February 17, 2014. http://www.centcom.mil/news/usace-completes-construction-of-medical-facility-in-shindand-read-more-http-www-dvidshub-net-new.

United States Corps of Engineers. “USACE Mission and Vision.” Accessed March 10, 2014. http://www.usace.army.mil/About/MissionandVision.aspx.

University of Saskatchewan College of Medicine. “Definition of Primary Health Care.” Accessed April 27, 2014. https://www.medicine.usask.ca/research/health-research-groups/primary-health-care-research-group-1/definition-of-primary-health-care/.

World Bank. “Arable Land (Hectares).” Accessed September 7, 2014. http://data.worldbank.org/indicator/AG.LND.ARBL.HA.

———. “Country Lending Groups.” Accessed July 28, 2014. http://data.worldbank.org/about/country-and-lending-groups# Lower_middle_income.

———. “GDP per capita (Current US $).” Accessed June 1, 2014. http://data.worldbank.org/indicator/NY.GDP.PCAP.CD.

———. “GNI Per Capita, Atlas Method (Current US $).” Accessed September 7, 2014. http://data.worldbank.org/indicator/NY.GNP.PCAP.CD? display=map.

———. “Health expenditure (% of government expenditure).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SH.XPD.PUBL.GX.ZS.

———. “Hospital beds (per 1000 people).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SH.MED.BEDS.ZS.

———. “How We Classify Countries.” Accessed April 27, 2014. http://data.worldbank.org/about/country-classifications.

———. “Improved Sanitation Facilities (percent of population with access).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SH.STA.ACSN ?page=2.

———. “Improved Water Source (percent of population with access).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SH.H2O.SAFE.ZS.

———. “Infant mortality rate (per 1000 live births).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SP.DYN.IMRT.IN.

———. “Labor Force Participation Rate, Total.” Accessed September 7, 2014. http://data.worldbank.org/indicator/SL.TLF.CACT.ZS/countries/1W?display=graph.

———. “Life expectancy at birth (years).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SP.DYN.LE00.IN.

———. “Malnutrition prevalence, weight for age (% of children under 5).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SH.STA.MALN. ZS?page=1.

———. “Maternal mortality ratio (modeled estimate per 100,000 live births).” Accessed June 1. 2014. http://data.worldbank.org/indicator/SH.STA.MMRT.

———. “Measles vaccine coverage rate (% children 12-23 months).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SH.IMM.MEAS.

———.“Mortality rate, under-5 (per 1,000 live births).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SH.DYN.MORT.

———. “Physicians (per 1,000 People).” Accessed September 7, 2014. http://data.worldbank.org/ indicator/SH.MED.PHYS.ZS.

———. “Population 0 to 14 (%).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SP.POP.0014.TO.ZS.

———. “Population ages 65 and above (%).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS.

———. “Population growth (Annual %).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SP.POP.GROW.

———. “Population (Total).” Accessed June 1, 2014. http://data.worldbank.org/indicator/SP.POP.TOTL.

World Health Organization. “Cooperation Strategy at a Glance: West Bank and Gaza.” May 2010. Accessed June 1, 2014. http://www.who.int/countryfocus/cooperation_strategy/ ccsbrief_wbg_en.pdf.

———. “Human Resources for Health Country Profiles: Tokelau.” 2013. Accessed June 1, 2014. http://www.wpro.who.int/hrh/documents/publications/wpr_hrh_county_profiles_tokelau_upload.pdf.

———. *National Burden of Disease Studies: A Practical Guide, Edition 2.0*. Geneva, Switzerland: WHO, October 2001. Accessed September 25, 2014. http://www.who.int/healthinfo/nationalburdenofdiseasemanual.pdf.

World Health Organization Eastern Regional Mediterranean Office. “Afghanistan Health Profile.” Last modified 2012. Accessed February15, 2014. http://rho.emro.who.int/rhodata/?theme=country.

World Health Organization Global Health Observatory. “Under-five Mortality.” Accessed March 2, 2014. http://www.who.int/gho/child_health/mortality/mortality_under_five_text/en/.

World Health Organization: Global Health Observatory Data Repository. “Children aged <5 years underweight: Data by country.” Accessed June 1, 2014. http://apps.who.int/gho/data/node.main.522.

———. “One year-old immunized with BCG (%).” Accessed June 1, 2014. http://apps.who.int/gho/ data/node.main.A830?lang=en.

———. “One year-old immunized with DPT3 (%).” Accessed June 1, 2014. http://apps.who.int/gho/ data/node.main.A827?lang=en.

———. “One year-old immunized with HBV3 (%).” Accessed June 1, 2014. http://apps.who.int/gho/ data/node.main.A828?lang=en.

———. “One year-old immunized with measles vaccine (%).” Accessed June 1, 2014. http://apps.who. int/gho/ data/node.main.A826?lang=en.

———. “One year-old immunized with OPV3 (%).” Accessed June 1, 2014. http://apps.who.int/gho/ data/node.main.A831?lang=en.

———. “Under 5 mortality rate (probability of dying by age 5 per 1000 live births).” Accessed June 1, 2014. http://apps.who.int/gho/data/node.main.ChildMort-2?lang=en.

World Health Organization: Regional Office for Africa. “Eritrea: Factsheets of Health Statistics 2010.” Accessed June 1, 2014. http://www.afro. who.int/en/eritrea/country-health-profile.html.

Worshipful Society of Apothecaries of London. “Diploma in the Medical Care of Catastrophes.” Accessed September 1, 2014. http://www.apothecaries.org/examination/ diploma-in-the-medical-care-of-catastrophes/.